RESULTS OF ARCHEOLOGICAL INVESTIGATIONS IN SEARCH OF THE ORIGINAL FLAGPOLE, FORT HAYS STATE HISTORIC SITE (14EL301), ELLIS COUNTY, KANSAS

Marsha K. King

Archeology Office
Kansas State Historical Society
Topeka, Kansas

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ABSTRACT

Archeological investigations were recently completed on the parade ground at Fort Hays State Historic Site (14EL301) as part of a continuing effort to identify the location and remains of the post's original flagpole. The investigation, which was initiated in advance of proposed construct of a replica of the original flagpole, was recommended by the Historic Sites Archeologist. Initial testing had been conducted at the site by Society staff archeologist Martin Stein and Cottonwood Ranch site curator Don Rowlison in 1996 and 1997. Based on the results of this testing, excavations were carried out by Society staff archeologist Marsha K. King between September 18 and October 1, 1998. This report includes a summary of the preliminary testing and the report of the subsequent excavations on the Fort Hays parade ground.

The archeological investigations undertaken near the center of the Fort Hays (14EL301) parade ground succeeded in identifying the location of the 1867 flagpole and evidence of the method of original construction and later removal of this flagpole. While no intact vertical section of the fort's original flagpole was found during excavation of F#981, significant buried structural remains of the flagstaff's subterranean support system were documented. The structural remains included intact planking, a 4 ft-5-in long, badly deteriorated splintered section of the flagpole, and other wood elements probably used as bracing in the construction. All of the wood used in the flagpole construction was white oak, which is not native to the vicinity of the fort. Distinct differences between the feature fill and the surrounding subsoil indicated that the upper portion of the flagpole hole was excavated as a shallow basin, probably using an animal-drawn slip. The lower portions of the feature, consisting of a central hole and four trenches extending to a maximum depth of 11 ft-3 in, were most likely excavated using hand tools. The flagpole erected in the center of the Fort Hays parade ground in the summer of 1867 was built with a strong subterranean support system consisting of thick wood planks laid in four trenches with the flagstaff extending between the anchoring wood planks and resting in a shallow depression in the subsoil below. While no intact evidence of wood elements connecting the planks and pole were noted during excavation, it appears likely, based on the dimensions of other wood pieces recovered and the examples from other military posts, that angled bracing and a box frame were probably used to securely attach the anchoring planks to the flagstaff.

When the 1867 flagpole was moved to the north end of the parade ground, sometime prior to 1873, it appears that the soldiers excavated along the southeasterly side of the old pole. Almost all of the original pole was removed, although a nearly 4.5-ft long wood splinter remaining in the feature fill was interpreted as being a deteriorated or damaged piece of the original flagpole that was left behind. During removal of the old flagpole, some of the heavy wood planks anchoring the base, angled bracing, and box frame connecting the planks to the pole, were damaged and/or removed. No nails, spikes, pegs, or holes for these, that might have been used to connect the various elements together were left behind. When the resulting hole in the parade ground was filled, many fragments of wood left behind.

Significant portions of the underground support system for the flagpole were left intact below 250 cm (98.5 in or 8 ft-2.5 in) bd. The remaining portion of the feature is expected to included two backfilled trenches ("North" and "East" trenches), possibly containing remnants of heavy wood planks similar to those in the south half of this feature. It is recommended that if and when a replica flagpole is erected on the parade ground at Fort Hays State Historic Site that it be located a short distance from the excavated feature (F#981). Suggested possible locations for a flagpole reconstruction include: a few meters south of the wood planks located at the south end of the "South Trench;" a few meters west of the far end of the wood planks located at the west end of the "West Trench;" or at least five meters (16.25 ft) north of the north edge of the work area excavated on the northerly side of X-981.

ACKNOWLEDGMENTS

A number of individuals helped with the field investigations and analysis involved in the search for the original flagpole at Fort Hays. The 1998 fieldwork at Fort Hays was greatly assisted by the help of eleven volunteers who donated a total of 222 hours toward successful completion of the project. Seven of the volunteers were members of the Kansas Anthropological Association (KAA), a state-wide amateur group which has worked closely with the Society for many years. The KAA members included: Delbert Dietrick, Ann Greitl, Cleta and Cleve Mulder, Lon Palmer, and Margie and Harold Reed. Two of the volunteers were members of the Friends of Fort Hays, Elton Beougher and Don Kuhn. The other volunteers were Meghan Tucker, a local high school student, and her younger brother. Much of the volunteers' efforts consisted of heavy labor, including shoveling, troweling, and lifting heavy buckets in fair weather and foul.

Fort Hays museum staff members Connie Schmeidler and Tammy Younger put in a total of 76.5 hours working on the excavation. In addition to freeing up his two staff members, site curator Bob Wilhelm provided moral support, ice water, donuts, and coffee for volunteers. Staff archeologist Martin Stein provided details of his previous work on the project and a wealth of background information, and served as a sounding board for ideas about how best to continue the search.

Other knowledgeable individuals in the region provided their own expertise to the project. Steve Allie, the director of the Frontier Army Museum at Fort Leavenworth, provided information about military flagpole construction and shipments through Fort Leavenworth. Elton Beougher, a math professor at Fort Hays State University provided calculations of the flagstaff height and worked on the problem of wind stress on a flag and pole. Dr. Mary Adair at the Museum of Anthropology at the University of Kansas performed analysis of wood samples and smoking pipe residue. Dr. Joseph Thomasson, professor in the Biology Department at Fort Hays State University, analyzed and reported on the wood samples recovered during the excavations. The work and support of all of these individuals was greatly appreciated.

The flagpole project was followed closely by the local media, publicity which the site appreciated. The Hays CBS affiliate reported on the fieldwork twice. A local cable news station filmed the Wednesday, September 30, open house and repeated their story several times. The *Hays Daily News* sent reporters and photographers to the site, carried several stories on the project, and used a quote in their "Quotable Quotes" section. The Fort Hays State University paper, *The University Leader*, also conducted interviews at the site and ran an article on the flagpole excavation. Many local individuals and some tourists from further away, visited the excavation site during the field project to find out what was being found. Some returned to follow the project to its successful completion at the base of the flagpole.

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INTRODUCTION

The Archeology Office recently completed archeological investigations at Fort Hays State Historic Site (14EL301) in search of the location and remains of the post's original flagpole. The investigation was initiated due to plans by the Friends of Fort Hays to construct a replica of the original flagpole on the parade ground at the historic military fort (Figures 1 and 2). The Historic Sites Archeologist recommended that archeological investigations be performed within the parade ground. Initial testing was conducted at the site by Society staff archeologist Martin Stein and Cottonwood Ranch site curator Don Rowlison in 1996 and 1997. Based on the results of this testing, excavations were carried out by Society staff archeologist Marsha K. King between September 18 and October 1, 1998. This report includes the results of both the preliminary testing and the subsequent excavations on the Fort Hays parade ground.

ENVIRONMENTAL SETTING

Physiographically, historic Fort Hays is located within the Smoky Hills division of the Dissected High Plains section of the Great Plains province of the Interior Plains division of North America as defined by Schoewe (1949:280, 309-311). The Dissected High Plains section essentially constitutes the heavily dissected eastern front of the High Plains of western Kansas. As described by Wedel (1959:10), this region is characterized by "...a broken landscape of high plateau like uplands, prominent and often sharply indented east-facing sandstone or limestone escarpments, conspicuous headlands, isolated buttes, hills, and rolling lowland plains." Located north of the Arkansas river and covering most of north central Kansas, this portion of the Dissected High Plains is made up of two distinct ranges of uplands which parallel each other in a northeast-southwest irregularly trending fashion. Bedrock is of Cretaceous age. The eastern range (and sometimes the entire Dissected High Plains area) is commonly referred to as the Smoky Hills; it is formed mainly in thick beds of Dakota sandstone. The western range is referred to as the Blue Hills; the bedrock there consists mainly of limestones and shales (Mandel 1987).

The project area is located within the west central portion of the Smoky Hills division of the Dissected High Plains. Some of the major cities within the Smoky Hills include Hays, Russell, Ness City, Phillipsburg, Minneapolis, Salina, Lyons, and Larned. Notable Smoky Hills landmarks include Coronado Heights and Pawnee Rock, which are singularly large outcrops of Dakota sandstone, and Rock City, an area of numerous large sandstone concretions. Ranging from twenty to forty miles wide, the Smoky Hills region is a maturely dissected broad hilly belt having a relief in places of up to 200-300 ft. In general, however, the relief is much less. Topographically, the region consists mainly of largely indistinct terraces and dissected escarpments, with numerous outlying hills and mounds. The major rivers of the region--the Republican, Solomon, Saline, and Smoky Hill--flow in an easterly or southeasterly direction through flat-bottomed valleys ranging up to two or three miles wide. Numerous spring-fed tributaries indent the valley margins; like the larger streams and rivers, their courses are commonly terraced lined. The bottomland soils are usually deep, well drained, and fertile (Mandel 1987).

Fort Hays is located between the Saline and Smoky Hill Rivers. Big Creek, which runs in a generally northwest to southeast direction between the old military post and the town of Hays, is a tributary of the Smoky Hill River. Soils in the parade ground vicinity are typically Harney-Carlson silt loams with one to three percent slopes. This soil type, part of the Harney-Carlson-Armo association, are deep, nearly

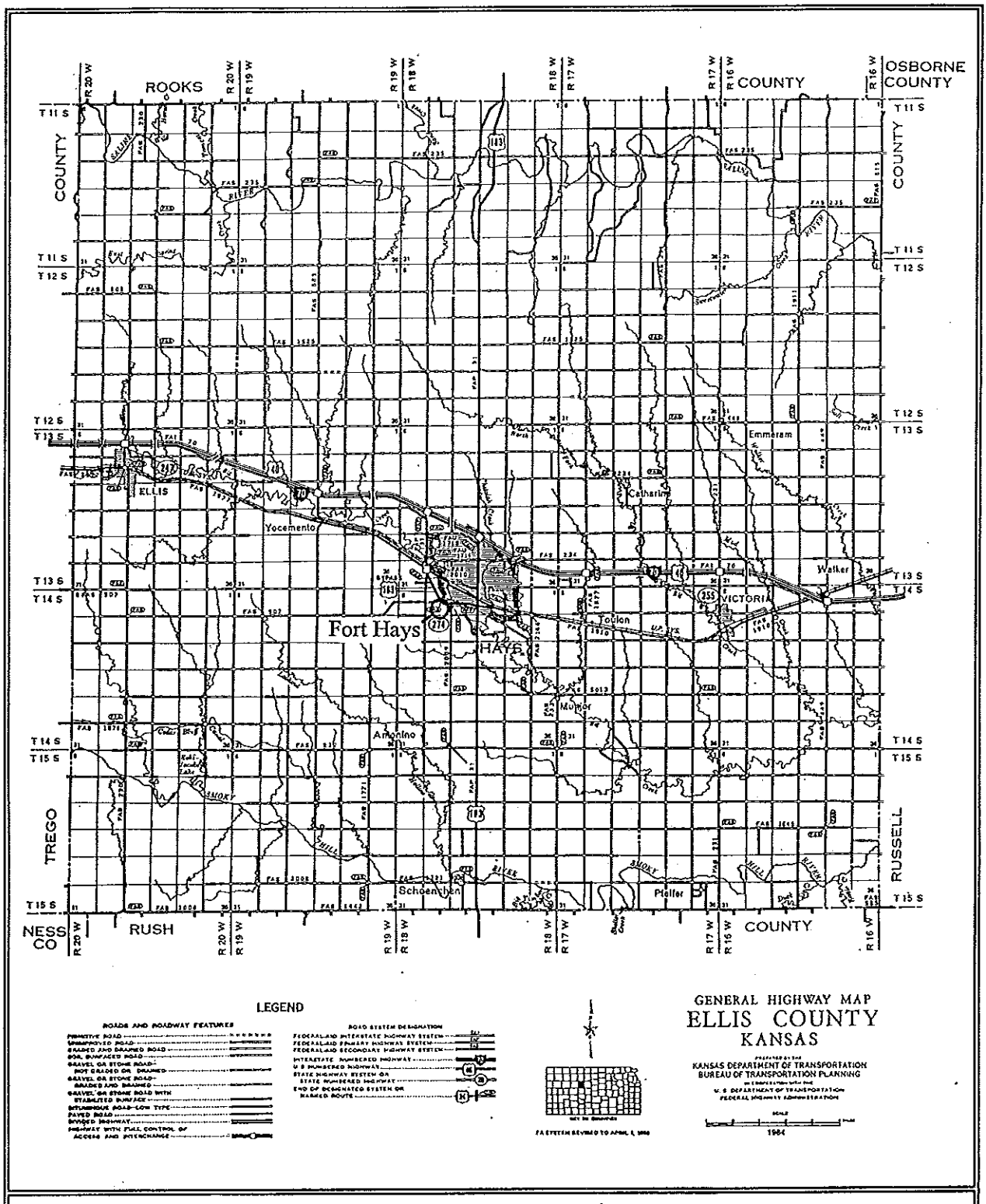


Figure 1. Ellis County Highway Map (KDOT 1984), showing the location of Fort Hays State Historic Site (14EL301), as indicated by circle.

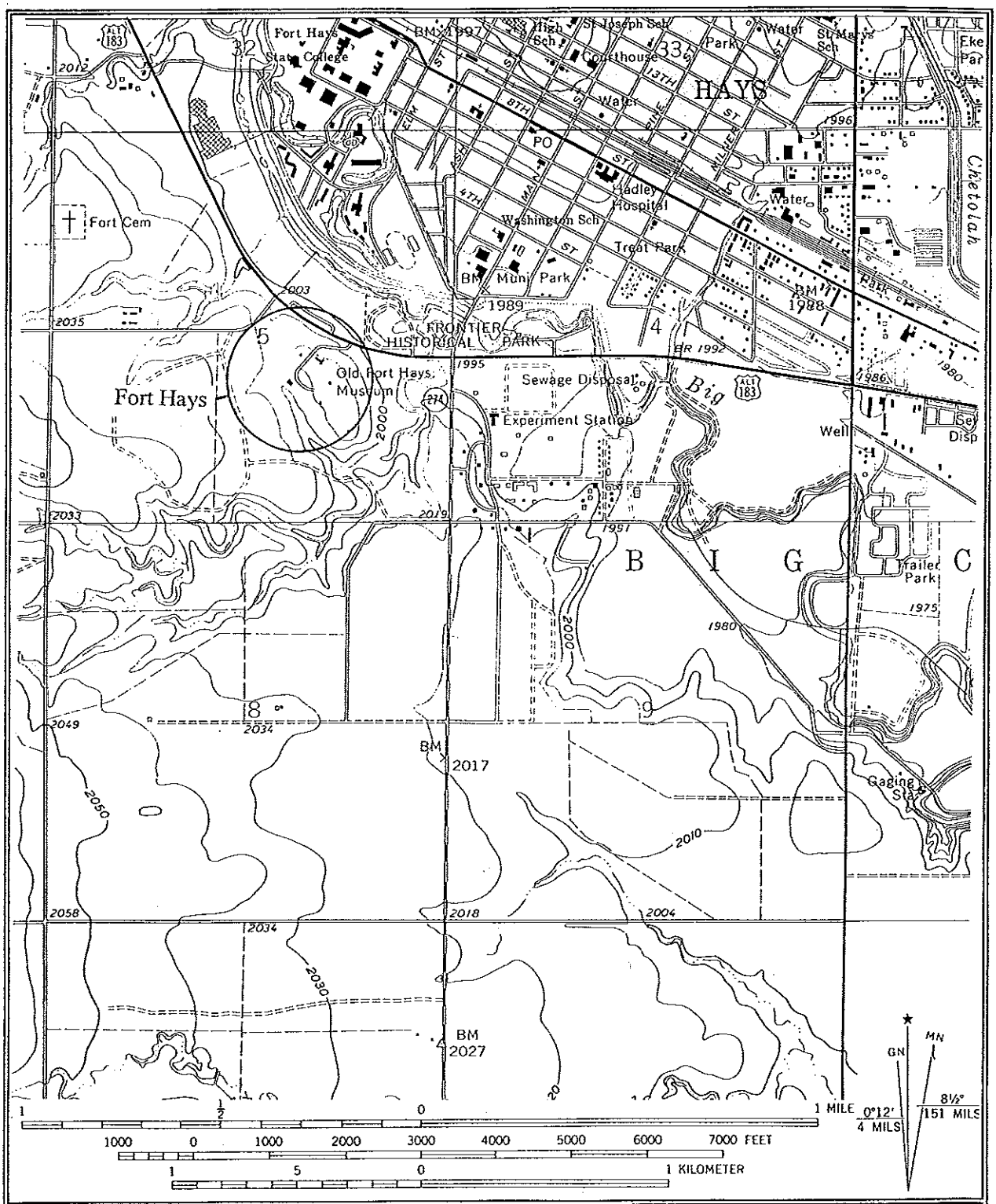


Figure 2. Section of the USGS (1961/83) *Hays South, Kans.* topographic map, showing the location of Fort Hays (14EL301), as indicated by circle.

level to strongly sloping, well-drained soils. They are located on the sides of widely spaced drainageways and in broad areas on uplands, and comprise some 32 percent of Ellis County soils. Soils in this association have a clay loam to silty clay subsoil. The Harney-Carlson silt loams with one to three percent slopes are found on ridgetops and tablelands (USDA 1975:8, 27).

The vegetation of the region prior to modern encroachment and change apparently consisted of prairie penetrated by riverine forest, with a few small patches of trees occupying sheltered locations on the prairie, mainly on steep escarpments and butte tops. According to Kuchler (1974), the potential natural vegetation of the region consists of tall grass prairie and mixed prairie dominated by bluestem and grama grasses, combined with floodplain forest or savanna vegetation consisting of tall, medium tall, and low broadleaf deciduous scattered trees and shrubs. Moving from east to west, the forests become narrower and lower, and often less dense. Dominant trees include hackberry, cottonwood, willow, and elm. A variety of fruit and berry-producing shrubs such as chokecherry, wild currant, gooseberry, plum, and grape were also present in the forested areas (Mandel 1987).

These vegetational conditions supported a variety of animals and birds, many of which were exploited directly by humans. Bison, elk, deer, and antelope were present in abundance along with the Plains grizzly, black bear, wolf, coyote, cougar, wildcat, swift fox, black-footed ferret, badger, beaver, otter, porcupine, raccoon, prairie dog, tree squirrel, jackrabbit, cottontail, and numerous smaller rodents. Quail, wild turkey, prairie chicken, and grouse were available throughout the year along with ducks and geese in appropriate seasons and locations (Mandel 1987). According to Wedel (1959:12), the region could furnish "...an abundance of food..." for peoples wholly or primarily dependent on a hunting and gathering economy. In comparing the area to the High Plains, Wedel (1959:13) points out that

> ...there is here [in the Dissected High Plains] an increased and surer yearly precipitation, averaging from 22 to 30 inches or more; and this, added to fertile valley bottoms, relatively plentiful wood for fuel and building, water, and convenient flood-free terraces well suited for village locations, made the region an attractive one for native, as for the later white, farming peoples.

The natural ecology of this region has been altered by modern land-use practices. Today, most of the lands within Ellis County and much of this physiographic region are used for agricultural purposes, primarily the pasturing of cattle and the cultivation of crops such as wheat, corn, milo, and soybeans.

CULTURE-HISTORIC SETTING

Archeologically, research in this region of Kansas has yielded evidence of prehistoric human occupation dating from around 10,000 years ago and extending up to the modern era, and certainly has the potential for yielding more such evidence. Sites in the region usually represent habitation areas or small workshops and more rarely occur as villages or burial mounds. While the full extent of the area's archeological resources has yet to be determined, it is clear that the region contains materials deriving from all of the major cultural periods thus far identified in Kansas, i.e.,

Paleo-Indian	circa 20,000 B.C. to 6,000 B.C.
Archaic	circa 8,000 B.C. to A.D. 1
Early Ceramic	circa A.D. 1 to A.D. 1000

Middle Ceramic	circa A.D. 1000 to A.D. 1500
Late Ceramic	circa A.D. 1500 to A.D. 1800
Historic	A.D. 1541 to present

The list consists of broad and somewhat artificial categories, and there is some temporal overlap between periods. As might be expected, more is known about the most recent inhabitants than is known about the earliest. To date, a total of 23 archeological sites have been recorded in Ellis County. Twelve of the recorded sites are prehistoric, eight are historic, and three have both prehistoric and historic components. Of the 12 prehistoric sites recorded in the county, the temporal and cultural affiliation is known for only six. These include three Early Ceramic sites, one Middle Ceramic site, and two sites with both Early and Middle Ceramic components. Four of the eight historic sites are clearly associated with EuroAmerican occupations, while three are historic Native American sites and one has an unknown cultural affiliation. The temporal and/or cultural affiliations of the three sites with both prehistoric and historic components are unknown. Two of the historic sites recorded in Ellis County are associated with military occupations, Camp Fletcher/Old Fort Hays (14EL307) and Fort Hays (14EL301).

Brief Historical Sketch of Fort Hays (1865-1889)

The first U.S. military post in this vicinity was Camp Fletcher, established October 11, 1865. It was named for former Missouri Governor Thomas C. Fletcher. This early post was garrisoned by four companies of the 1st U.S. Volunteer Infantry, or "Galvanized Yankees," and two companies of the 13th Missouri Cavalry. The post was located near the Smoky Hill Trail crossing of the north fork of Big Creek, approximately 15 miles southeast of the later fort site on Big Creek. No permanent buildings had been constructed at Camp Fletcher when it was abandoned on May 5, 1866, shortly after the sale of the Butterfield Overland Despatch and cessation of travel along this route. In response to resumed stage traffic and railroad construction activities, Fort Fletcher was reestablished on October 17, 1866, at a site several hundred yards northeast of the earlier location. The garrison, consisting of Company C, 3rd U.S. Infantry, began construction of more substantial stone and log buildings. On November 11, 1866, the name was changed to Fort Hays in honor of Brigadier General Alexander Hays, a Pennsylvania native and graduate of West Point who was killed at the Battle of the Wilderness on May 5, 1864. During a May 1867 visit to the fort, General Winfield S. Hancock, commander of the Department of the Missouri, ordered the post to be moved from the flood plain to a new site nearer to the proposed railroad crossing of Big Creek. Before the move could be initiated, the post was destroyed by flooding in early June 1867 (Community Services Collaborative [CSC] 1990:5-10; Frazer 1980:54; Garfield 1931:56; Oliva 1980; Reynolds and Stein 1994:18).

Major Alfred Gibbs (7th U.S. Cavalry) selected a new site for Fort Hays on higher ground. During the summer of 1867 the post was relocated to the new site, laid out by Lieutenant Jackson, and the roughly-triangular 7,640 acre military reservation was surveyed by Lieutenant M.R. Brown, Chief Engineer of the Department of the Missouri (Figure 3). "Ft Hays," the "Fort Cemetery," boundaries of the military reservation, the "U.P.R.R.," "Denver Express Road," and three military roads leading to and from Fort Hays were shown on the General Land Office (USGLO 1867) survey plat of Township 14 South, Range 18 West, which was surveyed in June and July and platted in October of 1867 (Figure 4). The fort was constructed on an open plan, with no defensive walls or fortifications. The first structure built at the new site was a stone blockhouse with rifle ports. A large number of permanent structures were quickly built at the new site. Four frame enlisted company barracks and seven officers' quarters surrounded an open parade ground. Auxiliary buildings were located east and south of the parade ground in a reverse

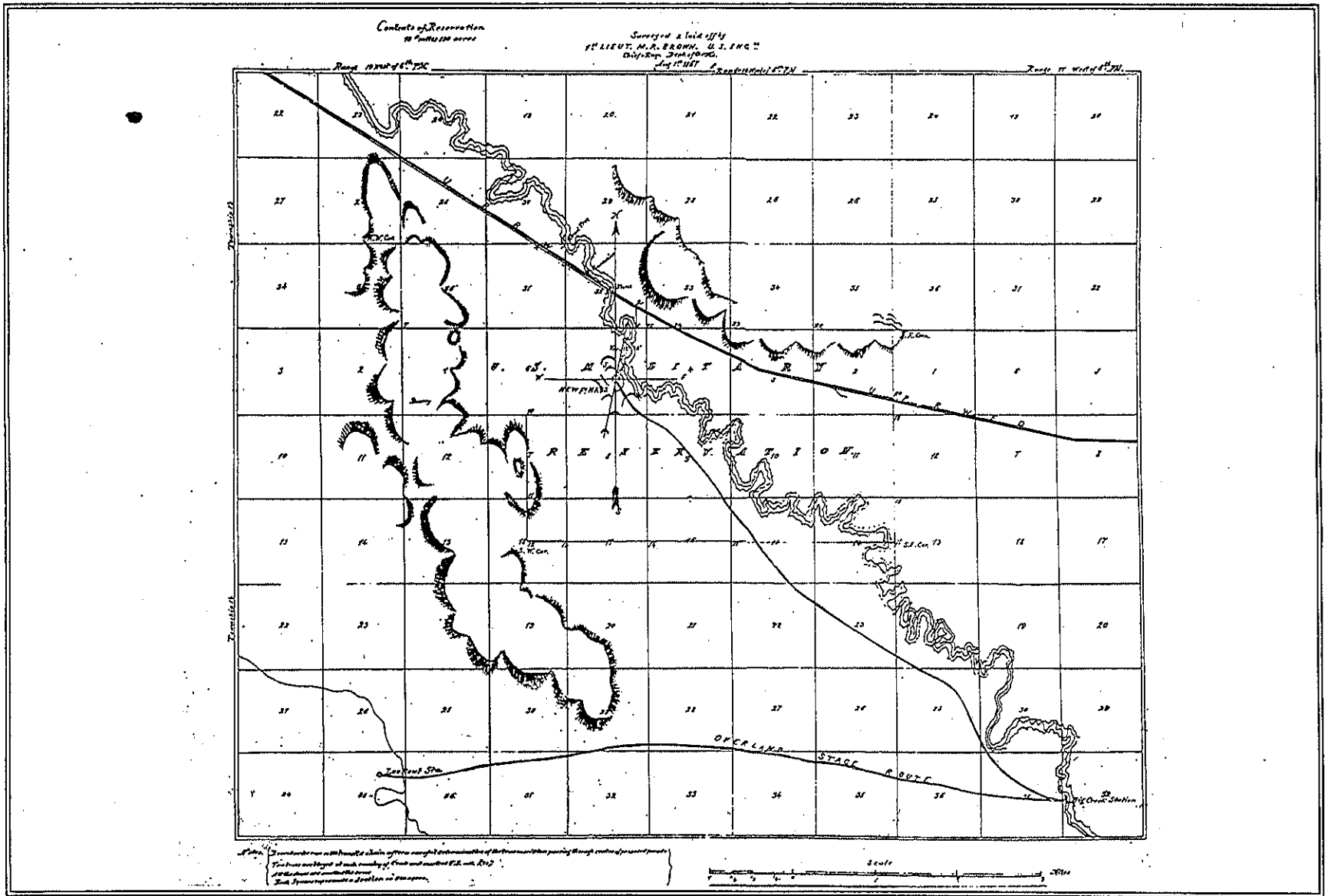


Figure 3. 1867 (Brown) Plan of the Military Reservation of Fort Hays, Kansas.

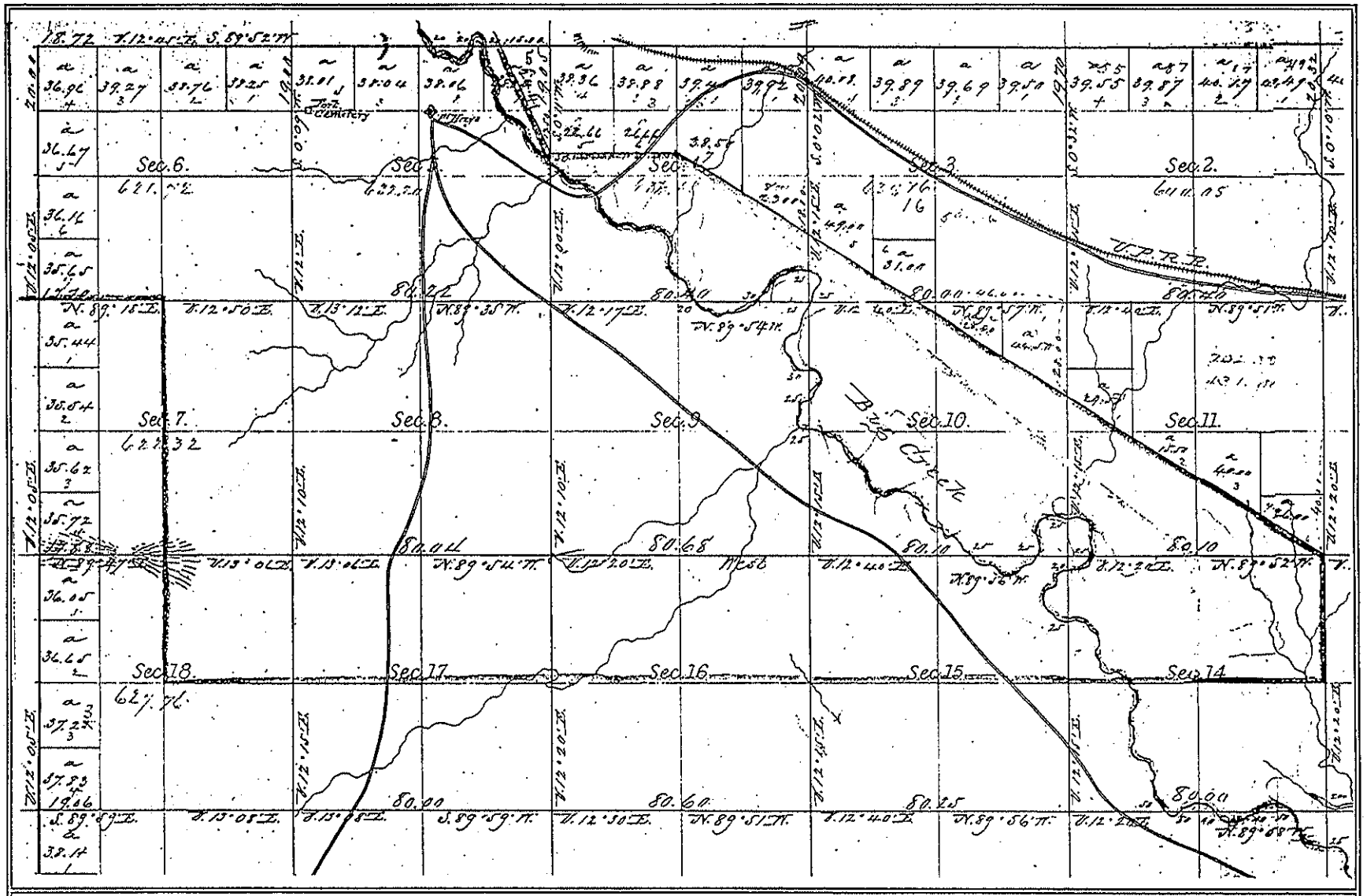


Figure 4. 1867 General Land Office (USGLO) survey plat of Township 14 South, Range 18 West showing "F' Hays," the "Fort Cemetery," boundaries of the military reservation, the "U.P.R.R.," and three military roads leading to and from Fort Hays.

L" pattern. These included: four frame laundresses' quarters, seven officers' quarters, three frame Quartermaster warehouses, one frame commissary storehouse, a frame guardhouse, a bakehouse, a prefabricated hospital consisting of two connected frame buildings, a surgeon's house, a dead house, stables, work shops, a granary, and ice house. Over the years that the fort was occupied by the military these buildings were repaired, replaced, and altered as necessary to remain serviceable. The frame guardhouse was replaced by a new stone guardhouse in 1872. The general appearance of the fort changed little over the years (CSC 1990:5-8; Frazer 1980:54; Garfield 1931:56; Mechem 1870; Mechem and Janeway 1875; Oliva 1980; Reynolds and Stein 1994:18).

This post, like Forts Harker and Wallace, was located on the Smoky Hill route and the proposed line of the Kansas Pacific Railroad (Figure 5). Soldiers stationed at Fort Hays protected stagecoach and freighting operations along the Smoky Hill Route, survey and construction crews building the Kansas Pacific railroad, and settlers in the area. By mid-October 1867, the Kansas Pacific Railroad had reached Hays City. Because of the fort's location near the railroad it served as a supply depot for other military posts in the region. Completion of the railroad to Denver in 1870 and declining Indian activity led General Pope, commander of the Department of the Missouri, to recognize that the system of military forts in Kansas was no longer required, and to recommend the closing of Forts Harker, Dodge, and Larned. He recommended the consolidation of these forces and activities at Fort Hays. This recommendation was repeated in 1871, and by 1872 the closing of Fort Hays was also recommended. The renewal of Indian activity in the area during the mid-1870s resulted in the post remaining active. By 1876 only one company of troops was stationed at Fort Hays. In a letter to Secretary of War Sherman in 1879, General Sheridan wrote that Fort Hays was no longer necessary for military purposes. While in 1882 Sherman accepted the recommendation that Fort Hays be abandoned, appropriations continued to be made for repairs and maintenance to the fort buildings (CSC 1990:5-9; Frazer 1980:54; Garfield 1931:56; Oliva 1980; Reynolds and Stein 1994:19). For a more detailed history of Fort Hays see Oliva 1980.

Fort Hays remained an active military post until September 20, 1889. The military reservation was officially abandoned by the government in November 1889, and on November 6 the lands were transferred to the Department of the Interior for sale to the highest bidders. Local residents, including the Ellis County Agricultural Society of Kansas, encouraged their congressmen to help them acquire part of the Fort Hays Military Reservation for use as an experimental agricultural station. Pressure was exerted on the federal government to secure portions of the old Fort Hays Military Reservation for public use. An appraisal of the reservation was conducted in 1894 and Congress passed legislation in 1895 to donate the old fort grounds to the State of Kansas for use as an agricultural station, Normal school, and park. This act was never signed by the president. Questions arose concerning a prior claim to the odd-numbered sections based on land grants made in 1862 and 1864 to the Union Pacific Railroad. Disposition of the military reservation was disputed in court, which was eventually settled in favor of the State of Kansas. In 1899 a new appraisal was ordered by the Secretary of the Interior and the land was reopened to settlement. By an Act of Congress dated March 28, 1900, the entire military reservation was transferred to the State of Kansas (U.S. *Statutes at Large*, vol. 31, ch. 110). The land was to be used to establish a branch of the State Normal School, to establish an experiment station operated by the State Agricultural College, and to create a public park. If the lands were not used for these purposes they were to revert to the federal government. The state legislature formally accepted the land in 1901 (Kansas *Session Laws*, ch. 421), appropriated funds, and established a 3,700 acre Agricultural Experiment Station and the Western Branch of the Normal School at Emporia (Kansas *Session Laws*, ch. 220). The school was renamed Fort Hays Normal School in 1914 (Pankratz 1979:51-52).

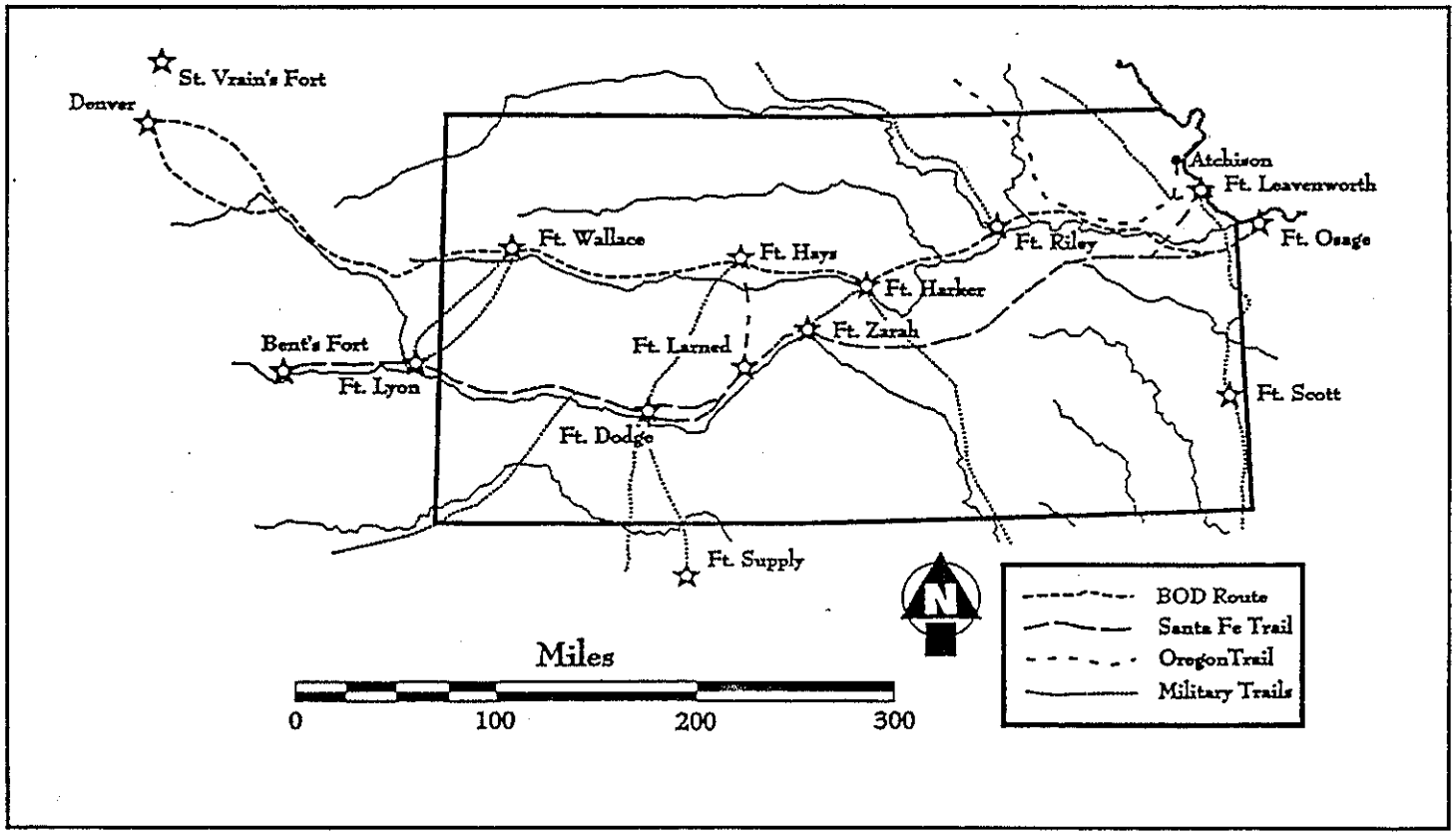


Figure 5. Location of Fort Hays on the Smoky Hill route of the Butterfield Overland Despatch (BOD) (King 1997:26).

By the time the state acquired the fort land, the buildings had been empty for more than a decade and were in poor condition. Five fort buildings were removed to the experiment station, and the old post hospital was used by the school, and many other fort buildings were moved to new sites in the nearby town. The two stone structures, the Blockhouse and Guardhouse, remained standing on their original sites and were used by the Normal school. In 1905 burials in the post cemetery were removed and reentered in the National Cemetery at Fort Leavenworth. Since the early 1900s, portions of the old military reservation have been used as an agricultural research station, a state normal school, the campus of Fort Hays State University, a city park, and a golf course (CSC 1990:5-10; Frazer 1980:54; Garfield 1931:56; Oliva 1980:61).

The 1905 (Ogle) county atlas showed an outline of the "Old Fort Hays Military Reservation." The southeastern part of the old reservation was labeled as the "Kansas State Agricultural College," while the southwest and northwest portions were "Branch of the State Normal School" (Figure 6). The detail of Township 14 South, Range 18 West in the 1905 atlas depicted six structures in the south half of Section 5 (Figure 7). These included the "Old Guard House," the "Old Ford" (probably the Blockhouse), and four building apparently associated with the "Res. [residence] of W.S. Picker." This map also showed a cemetery in the NW1/4 of Section 5, a building labeled "Normal School" to the north in the SE1/4 of Section 32, and a number of buildings, sheds, wells, and tanks to the east associated with the agricultural experiment station in the SW1/4 of Section 4.

The 1922 (Ogle) atlas of Ellis county also indicated the boundaries of the "Old Fort Hays Military Reservation," showing the "Fort Hays Kansas Normal School" to the west and northwest and the "Fort Hays Branch of the Kansas State Agricultural College Experimental Station" to the east (Figure 8). The detail of Township 14 South, Range 18 West, showed three buildings in the SW1/4 of Section 5 (Figure 9). These buildings were labeled "Old Fort Hays Block House," "Guard House," and "Officers Quarters." The words "Golf Grounds" indicated the usage of the area surrounding these buildings. The cemetery was still shown in the NW1/4 of Section 5. The notation "Golden Belt Fair Assn. (lease)" was associated with nine structures on the east side of Big Creek in the NE1/4 of Section 5. Another label indicated that the "State Park Nursery" was situated north of the creek in the west central portion of Section 4. Nine structures and several roadways and fields associated with the agricultural experiment station were depicted on this map in the SW1/4 of Section 4, including two buildings labeled "Supt. Res. [Superintendent's Residence]," and "Office."

Legislation passed in 1929 (Kansas *Session Law*, ch. 274) and 1931 (Kansas *Session Laws*, ch. 66) designated the State Board of Regents as the responsible authority and determined that the boundaries of the "Kansas Frontier Historical Park on the Fort Hays Military Reservation" should include the sites of all the buildings which were part of Fort Hays. Subsequently, approximately 200 acres were set aside, but not all of this property was managed as a park. Portions of the fort site situated north of a bisecting roadway, containing the northern portion of the parade ground and the stables and workshops, was cultivated. At this time the two remaining stone buildings and the old parade ground area were developed as the Fort Hays Frontier Historical Park. Several old fort buildings which had been moved into town for private use were returned to the fort site. As a result of a 1931 lease to the Fort Hays Country Club, a golf course was laid out over 75 acres of the main post area. Kansas Highway 183 Bypass was constructed through the extreme north end of the parade ground in the 1950s. In 1963 the state legislature transferred much of the responsibility for the park to the Kansas State Historical Society [Society], but left decisions "subject to revision by the state board of regents" (Kansas *Session Laws*, ch. 445). In the mid-1960s the layout of the golf course, now under lease to the City of Hays, was modified to allow for historical

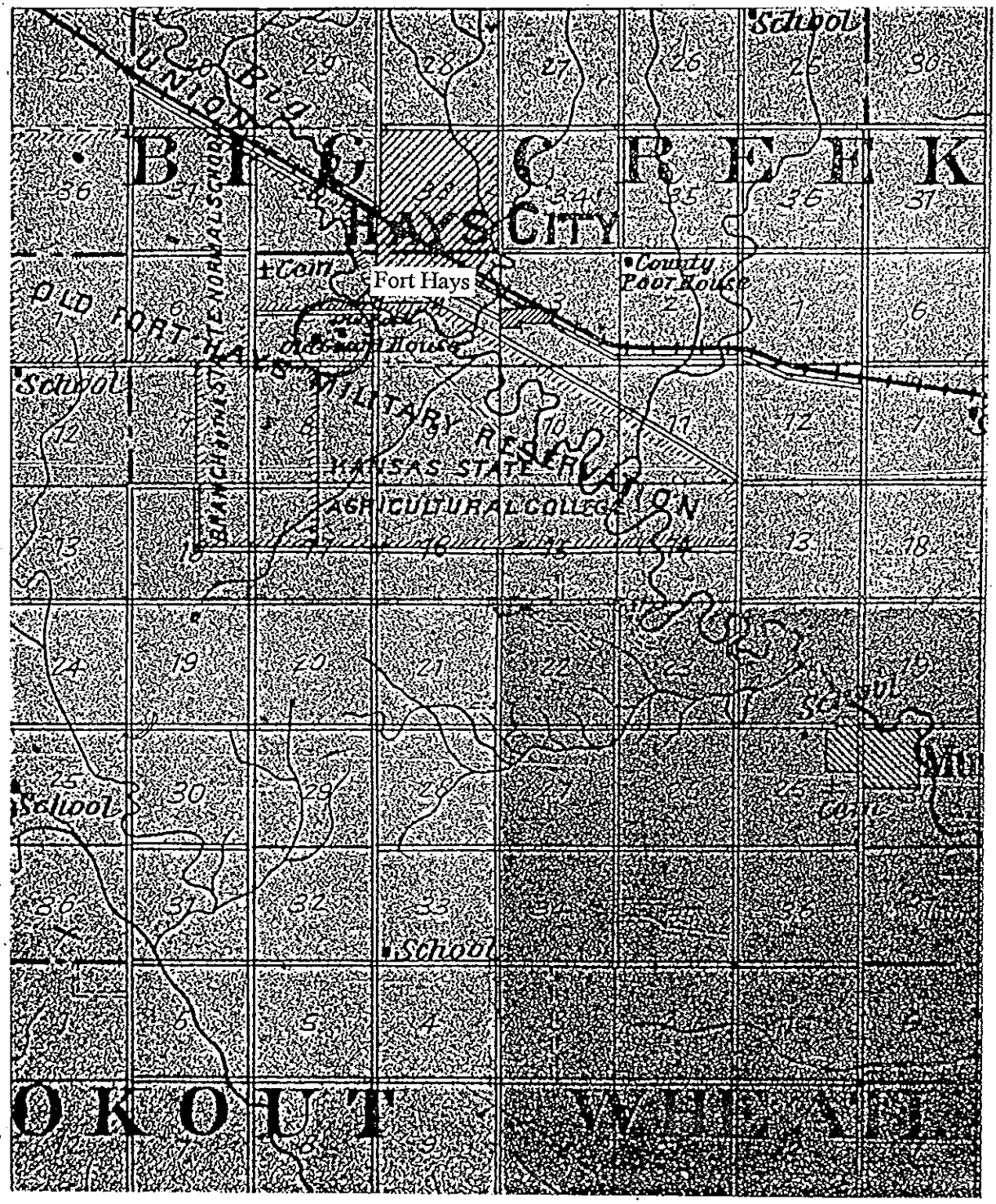


Figure 6. 1905 (Ogle) map showing the boundaries of the "Old Fort Hays Military Reservation," with Fort Hays State Historic Site (14EL301) circled.

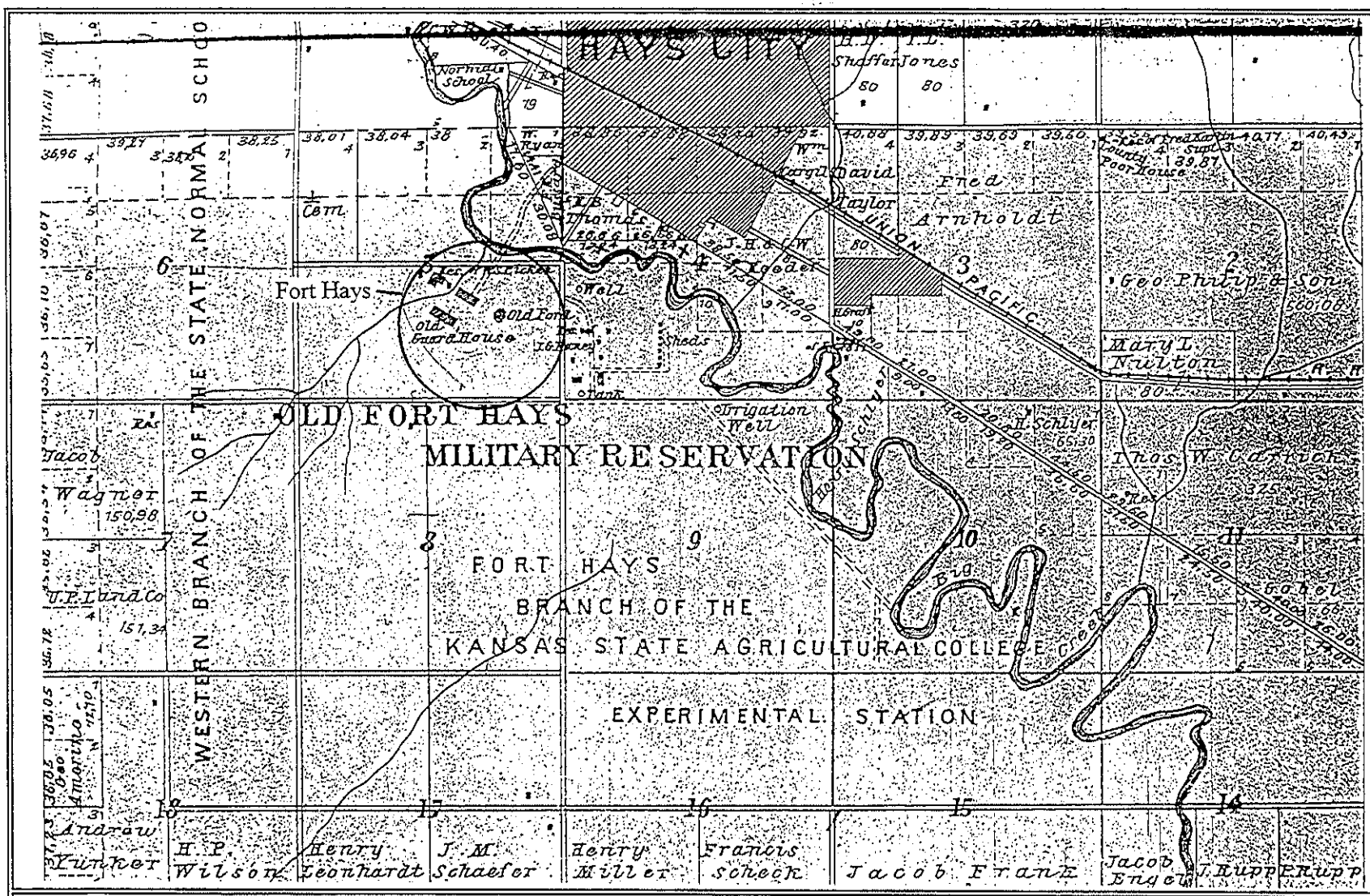


Figure 7. Detail from the 1905 (Ogle) atlas showing buildings and features associated with the "Old Fort Hays Military Reservation," the "Normal School," and "Fort Hays Branch of the Kansas State Agricultural College Experimental Station," with location of Fort Hays State Historic Site (14EL301) circled.

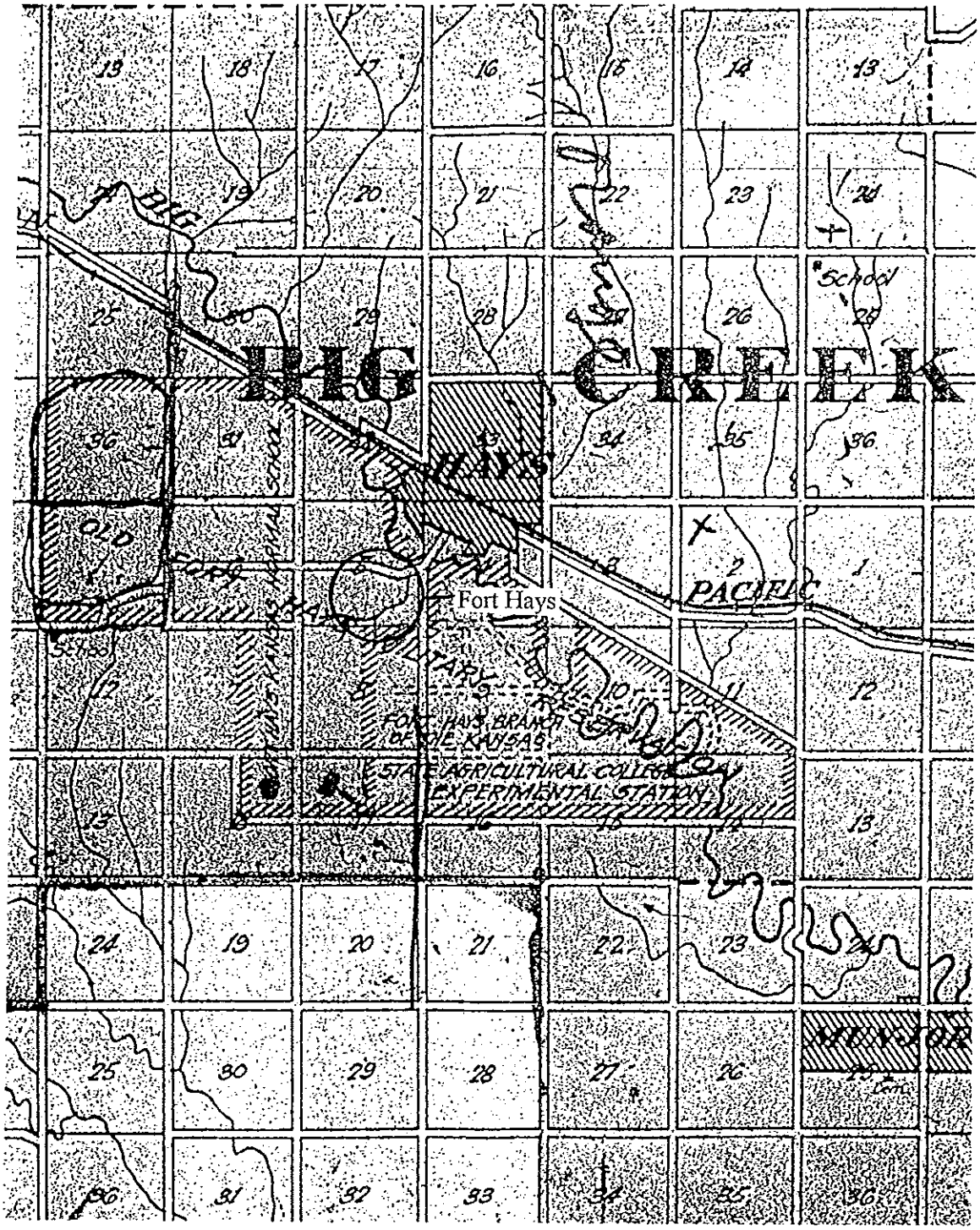


Figure 8. 1922 (Ogle) map showing the boundaries of "Old Fort Hays Military Reservation," with the location of Fort Hays State Historic Site (14EL301) circled.

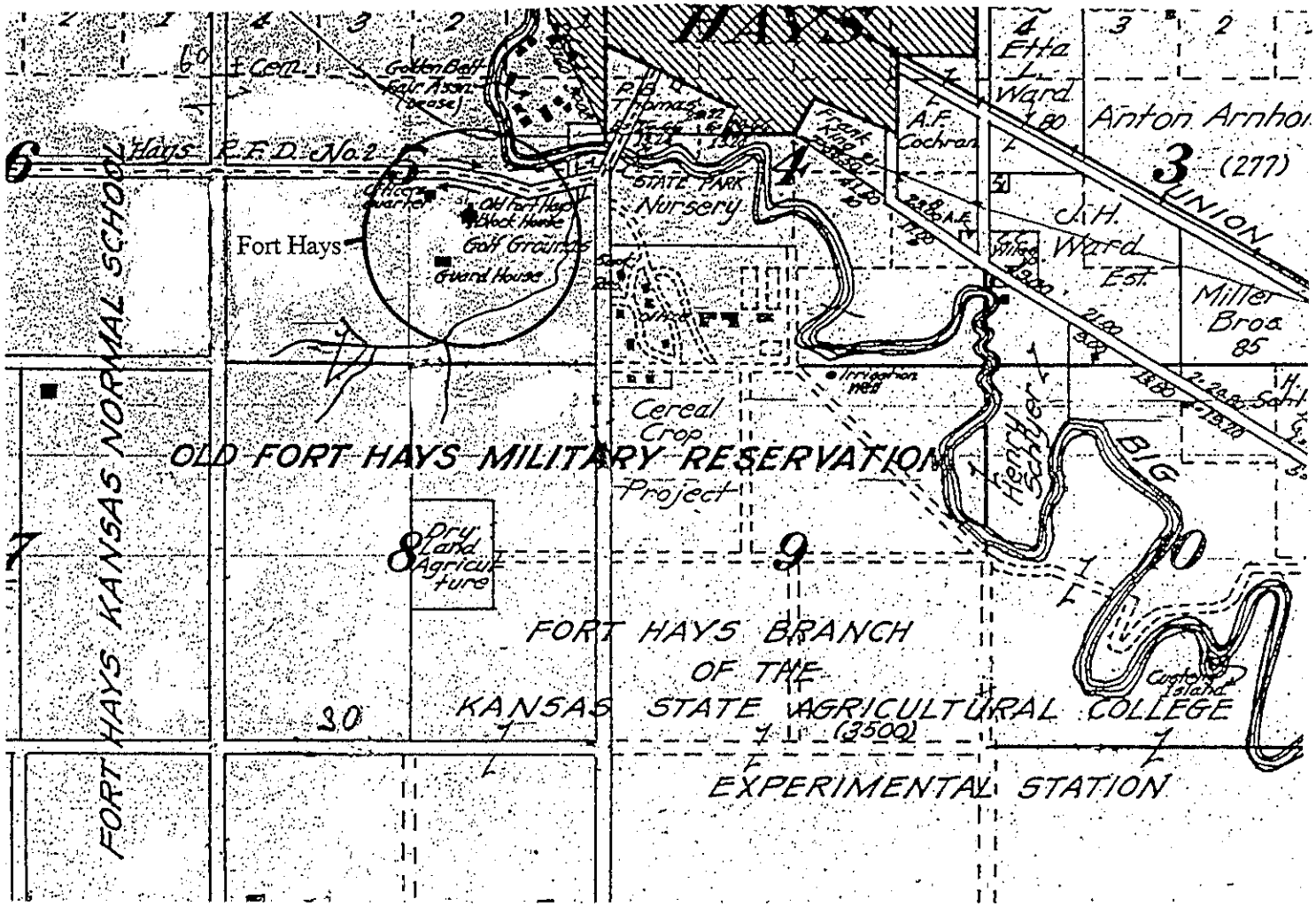


Figure 9. Detail from the 1922 (Ogle) atlas showing buildings and features associated with the "Old Fort Hays Military Reservation," the "Fort Hays Kansas Normal School," and "Fort Hays Branch of the Kansas State Agricultural College Experimental Station," with location of Fort Hays State Historic Site (14EL301) circled.

interpretation of the fort. Fort Hays was listed on the National Register of Historic Places on January 25, 1971. In 1974 the legislature simplified the shared responsibility issue, placing "custody and management" of the Frontier Historical Park in the secretary of the Society, "with the approval of the state board of regents" (Kansas *Session Laws*, ch. 418) The Society currently maintains approximately 25 to 30 acres of the original 200 acre park, including approximately one-half of the main post area, as a state historic site. The City of Hays and the Fort Hays Experiment Station, an administrative unit of Kansas State University, administer the property surrounding Fort Hays, which includes archeological remains of the historic fort (CSC 1990:11-12; Oliva 1980:61-62; Pankratz 1979:52; Pankratz, Reynolds and Stein 1996:2-3; Reynolds and Stein 1994:19).

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS AT FORT HAYS

Sponsored by the Society as a means of developing the site's interpretive potential, archeological investigations were conducted at Fort Hays State Historical Site (14EL301) between 1966 and 1970 (Table 1). These investigations were conducted under the supervision of Society staff archeologists Thomas P. Barr (1967, 1969, 1970a, 1970b), Francis A. Calabrese (1966), and Thomas A. Witty. Research topics addressed by the various seasons of fieldwork included: defining the layout and construction of fort-period buildings and features; and excavating latrines and building cellars for associated artifacts. With the exception of one building which was under a roadway, all of the residences along officers row were examined and the foundations outlined on the ground surface. The enlisted barracks and associated mess house on the west side of the parade ground and the mess house associated with another barracks on the east side of the parade ground were investigated. Fieldwork was conducted at the sites of the post hospital and surgeon's quarters, the post sutler's store and quarters, the bakery, and a coal house. In addition, a military dump area southwest of the main post was sampled (Reynolds and Stein 1994:19).

More recently, archeological investigations have been conducted at the site in advance of planned construction or development at Fort Hays State Historic Site. This work has been supervised by staff archeologists John Reynolds, Don Rowlison, and Martin Stein. During the summer of 1990 Rowlison supervised volunteers excavating a well house located south of the post hospital. This work discovered disturbance caused by later construction of a modern concrete well house. In February 1992 Reynolds and Rowlison supervised a volunteer crew composed of Kansas Anthropological Association (KAA) members investigating the blockhouse prior to stabilization of the structure. Test units were placed around the perimeter of the building to determine the depth of the historic foundation and its method of construction. The floors of the two projecting rooms were excavated to gather information about the original floor construction (Reynolds and Stein 1994:19). None of the previous archeological projects referenced above included the investigation or identification of the flagpole within their scopes of work.

The Society has an extensive collection of historic archeological materials from this Plains Indian War-era frontier military post in the Central Plains. Approximately 625 cu ft of cultural materials, stored in 729 boxes, were recovered from previous archeological investigations at Fort Hays. A few additional artifacts are currently on display at Fort Hays State Historical Site. This collection, one of the largest archeological collections from a Plains Indian War-period military fort in the Central Plains, has never been completely cataloged, analyzed, or reported.

One of the recommendations made in a 1979 (Pankratz) review of the Fort Hays State Historic Site was to "reconstruct the original flagpoles." This is an idea which the Society of Friends of Fort Hays have endorsed wholeheartedly. They have proposed to construct a replica at the fort of the flagstaff that once was located on the parade ground. As a result of this proposal, Bob Wilhelm, Curator at Fort Hays State Historic Site, and Ron Parks, Assistant Director of the Historic Sites Division of the Society, requested the

Table 1. Previous Archeological Investigations at Fort Hays State Historic Site (14EL301).

Year	Supervisory Archeologist	Focus of Excavations
1966	Calabrese	Sutlers Store, 8 pit toilets (F#65, 66, 68, 89, 111,141, and 143), 1 latrine (F#144, behind Officer's Quarters (H2 or 3)
1967	Barr	House 1 (F222); House 2 (kitchen area only); House 3; House 4 (Commanding Officer's); 10 pit toilets [F#201 (H1), F#202 (H1), F#211 (H2), F#264 (H6), F#295 (H1), F#336 (H1), F#373 (H4), F#374 (H2), F#431(H1)], 2 burn pits [F#220 (H3) and F#219 (H1, over F#336]; and middle F#309 (H7 or 8)
1968	Barr	House 4; House 5; House 6; House 7; House 8; House 9; West Barracks (A681); Well in Hospital Area (F#585); Hospital Area (A683); Hospital Cistern (F#612); East Barracks (A682, including mess, kitchen, and washhouse); Mess Hall foundation (A681); 4 pit toilets (F#549 (H9), F#583 and 589 (West Barracks), and F#617 (Hospital)
	Witty	Dump No. 1 (A685)
	Witty	Well near visitor's center
1969	Barr	Hospital (A691); Hospital cistern drain (F717); Ground Outlining, officer's row; 7 pit toilets, F#656 (H6), and 6 features in Hospital area (F#648, 670, 671, 696, 699, and 736)
1970	Barr	Bakery (A701); Surgeon's Quarters (A702); Coal Shed (A703); Officer's Row ground outline stabilization; Dump No. 1 (A705); 4 pit toilets, F#810 (Quartermaster's Warehouse), F#821 (H7), F#822 (H8), and F#834 (H8 intersecting F#822)
1990	Rowlison	Well house south of Post Hospital
1992	Reynolds and Rowlison	Blockhouse foundations

Source: Barr 1967, 1969, 1970a, 1970b; Calabrese 1966; Reynolds and Stein 1994:19

Society's Archeology Office to gather information about the location and construction of the historic flagpole. This information is necessary for and will be used to determine the placement of the replica flagstaff. It also will potentially aid in the design of the flagstaff replica. Documentary and archeological investigations were conducted to collect information about the exact location and construction of the historic flagpoles which once stood on the fort's parade ground.

DOCUMENTARY EVIDENCE OF THE FLAGPOLES AT FORT HAYS

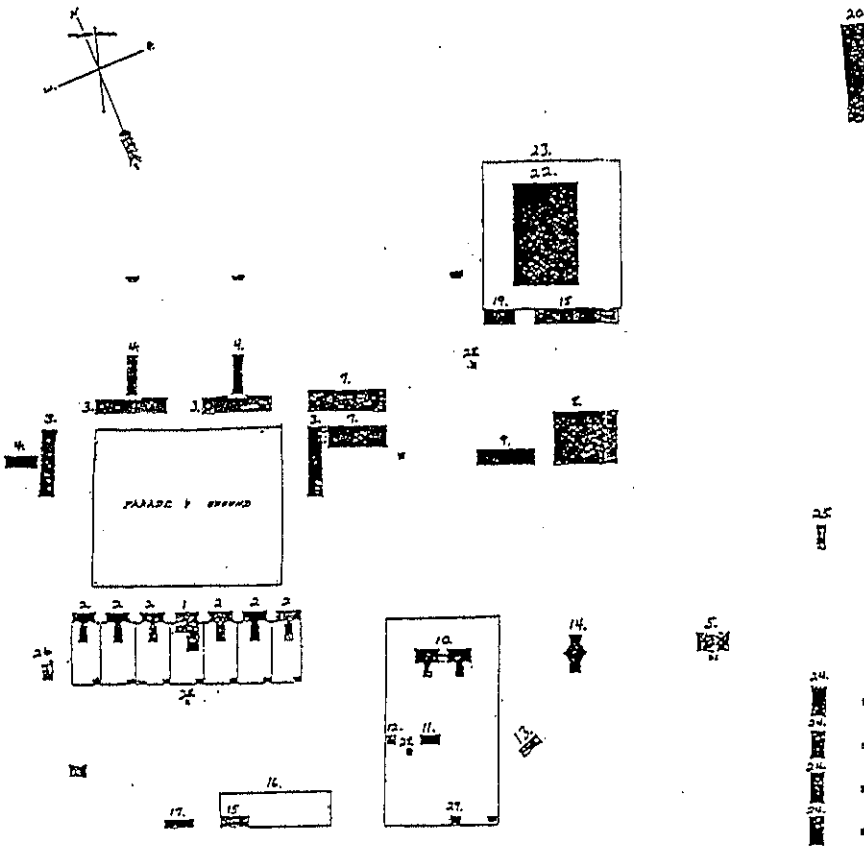
Historical maps and photographs of Fort Hays made between 1867 and 1882, when this frontier fort was actively occupied, show the flagpole in two different locations. The primary source of documentation for the location of Fort Hays' flagpoles consisted of five military plans of the main post area

of Fort Hays originally drafted between 1869 and 1889 (Wilhelm 1997). Two of these maps depicted a flagpole in the center of the parade ground. One of these was from records of the U.S. Quartermaster General dating to July 1869 (USQG) and the other was dated circa 1870 (FHSHS) (Figures 10 and 11). A plan of the fort published in 1876 by the Military Division of the Missouri (USA, MDM) did not indicate the location of the flagstaff. Three later maps show the flagstaff on the north side of the parade ground, centered between the two enlisted barracks and directly opposite the Commanding Officer's Quarters, which was located on the south side of the parade ground along "officers row." These include one plan of the fort dating to August 1879 (Adjutant General's Library), another from "between 1880 and 1885" (Ellis), and a third from "between 1885 and 1889" (USQG) (Figures 12-14).

Three photographs have been identified which show flags flying above Fort Hays. One of these photographs taken ca. 1867 (KSHS) shows the construction of the flagstaff at the site of Old Fort Hays, which was abandoned after the June 1867 flood (Figure 15). This photograph clearly shows this earlier flagstaff as two roughly-hewn tree trunks which were overlapped and connected above the ground by three encircling bands, probably of iron. The two nearly straight pole segments evidence scars where branches were removed. An 1869 (KSHS) photograph of Fort Hays shows an American flag flying above the roof tops of the fort buildings (Figure 16). While this photograph was taken from some distance east or northeast of the main post, it appears to show the flagstaff in the center of the parade ground. The 1873 (Van Vliet) photograph shows the flagpole at the north end of the parade ground centered between the two enlisted barracks (Figure 17). The flagstaff depicted in this photograph also consisted of two poles overlapping and joined together at a point above ground and overhead. The height of the pole was calculated from this photograph by Professor Elton Beougher (1996), from the Math Department at Fort Hays State University (Appendix A). These calculations were based on the assumption that the height of the men in the photograph was approximately 5 ft-6 in and information provided by Bob Wilhelm that flags of two sizes were known to have been flown over Fort Hays in 1873, 36 x 20-ft and 20 x 10 ft. The calculations from the 1873 (Van Vliet) photograph resulted in an estimated total above-ground height of the flagpole as 80 ft. The height of the lower section of the flagstaff was calculated at 43 3/4 ft above the ground surface, the upper portion as 45 ft, and the overlap as 8 3/4 ft. The flag in this photograph appeared to be the smaller 20 x 10-ft size.

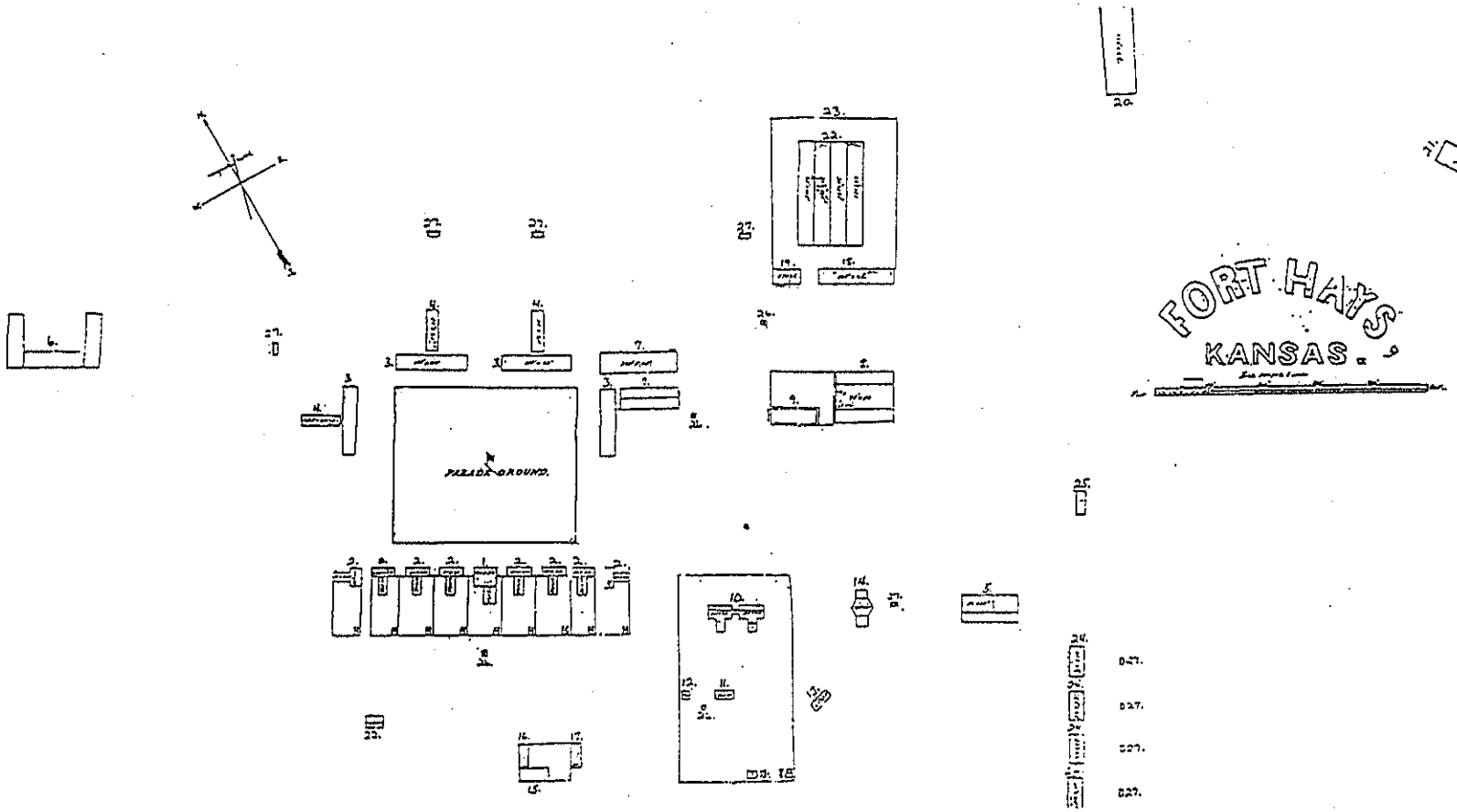
These historic maps and photographs strongly suggest that the flagstaff, which was originally placed in the center of the parade ground at Fort Hays in the summer of 1867, was moved to the north edge of the parade ground sometime between 1869 and 1873. The photographs further suggest that the flagstaff erected in the middle of the parade ground at the new fort site in the summer of 1867 was probably comprised of two overlapping poles joined by iron bands as had been used previously at the old fort site and later when the flagpole was removed to the north end of the parade ground.

Documentary and archeological investigations at other military posts, notably at Fort Larned, Kansas, and Fort Smith, Arkansas, provide details about military flagpoles and their construction. The height of the flagstaff at Fort Larned was estimated to be 120 ft above the ground (Hunt 1983). Support for this tall flagpole was provided by a 10-ft deep excavation into the ground and a subterranean or semi-subterranean support system. The Fort Larned flagstaff rested upon a base of wooden boards connected in a "x"-shape at the bottom of the 10-ft deep hole. The pole was connected to the base with a system of wooden lateral braces buried under the ground surface. Excavations at Fort Larned found remnants of the 15-in square flagstaff and portions of the brace and support system within the original excavation (Figure 18). Investigations at Fort Smith recovered evidence for similar, though slightly more complicated, subterranean support system (Coleman 1983a, 1985). The semi-subterranean flagpole base at this post consisted of four notched and overlapping wooden timbers with the pole socketed into the gap at the center of the timbers and further supported by diagonal wooden member running from the end of each timber to a point on the post (Figure 19). According to Steve Allie (personal communication) this style of underground



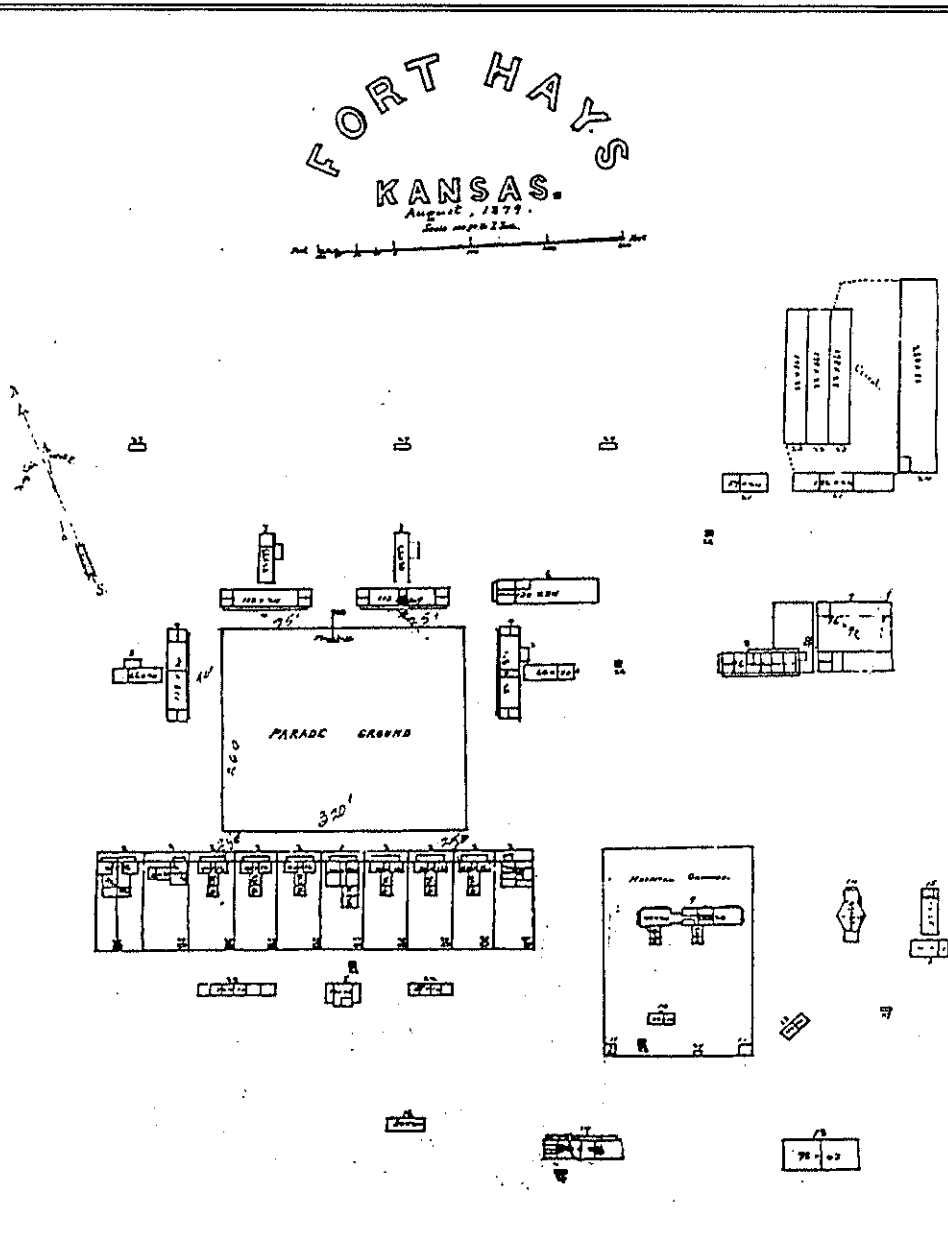
1	Commanding Officers' Quarters	16	Indian Pens
2	Officer's Quarters	17	Old Guard House
3	Company Quarters	18	Work Shop
4	Company Mess House & Kitchen	19	Employees Quarters
5	Traders Store	20	Grain House
6	Cavalry Stables	21	Ice House
7	Commissary Storehouse	22	Quarter Master Stables
8	Quartermaster's Storehouse	23	Quarter Master Corral
9	Quartermaster's Office	24	Laundress's Quarters
10	Post Hospital	25	Lime House
11	Hospital Steward's Quarters	26	Officer's Storehouse
12	Dead House	27	Commissary
13	Bakery	28	Wells
14	Headquarters (Block House)	29	Cow Stable
15	Guard House		

Figure 10. July 1869 (USQG) military plan of Fort Hays showing flagpole in center of parade ground.



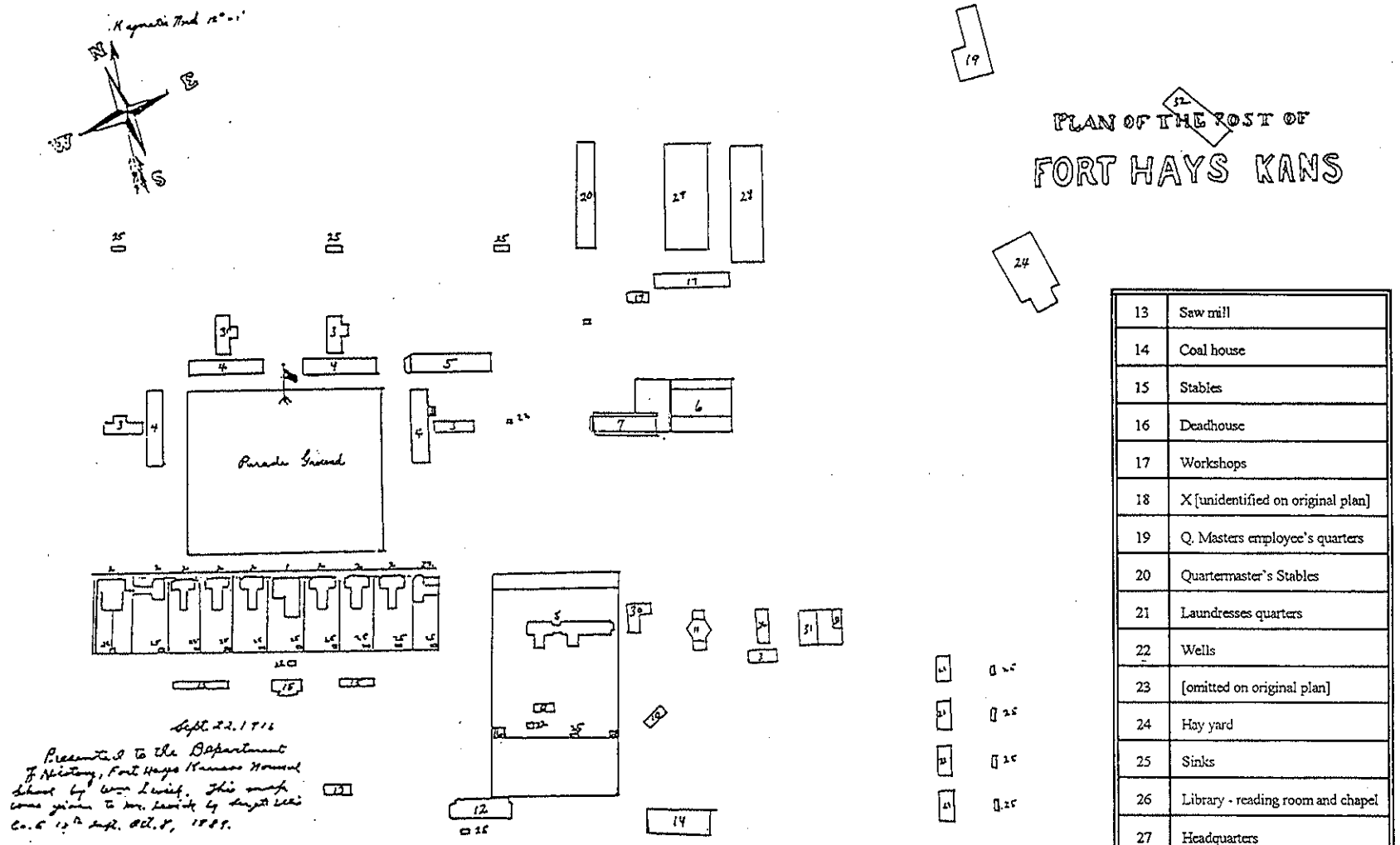
1	Commanding Officers' Quarters	8	Quartermaster's Store House	15	Guard House	22	Quartermaster's Stables
2	Officer's Quarters	9	Quartermaster's Office	16	Ordinance Store House	23	Quartermaster's Corral
3	Company Quarters	10	Post Hospital	17	Saw Mill	24	Laundresses' Quarters
4	Company Mess House & Kitchen	11	Hospital Steward's Quarters & Bathroom	18	Work Shops	25	Lime House
5	Traders Store	12	Dead House	19	Employee's Quarters	26	Wells
6	Cavalry Stables	13	Bakery	20	Grain House	27	Sinks
7	Commissary Store Houses	14	Post Headquarters (Block House)	21	Ice House		

Figure 11. Circa 1870 (FHSH) military plan of Fort Hays showing flagpole in center of parade ground.



1	Comdg. Officers' Quarters	15	Band Barracks
2	Officer's Quarters	16	Saw Mill
3	Kitchens, Mess and Wash houses	17	Guard House and Ordnance Room
4	Company Barracks	18	Coal House
5	Comdg. Officer's Stable	19	Ordnance and Comsy. Sergt's. Qrs.
6	Subsistence Store-house	20	Laundresses' Quarters
7	Qr. Mr. Store-house	21	Work-shops
8	Qr. Mr. Office	22	Cow Stables
9	Hospital	23	Cavalry Stables
10	Hospital Steward's Quarters	24	Qr. Mr. Stables
11	Dead-house	25	Grain House
12	HospitalStable	26	Wells
13	Bakery	27	Sinks
14	Block House		

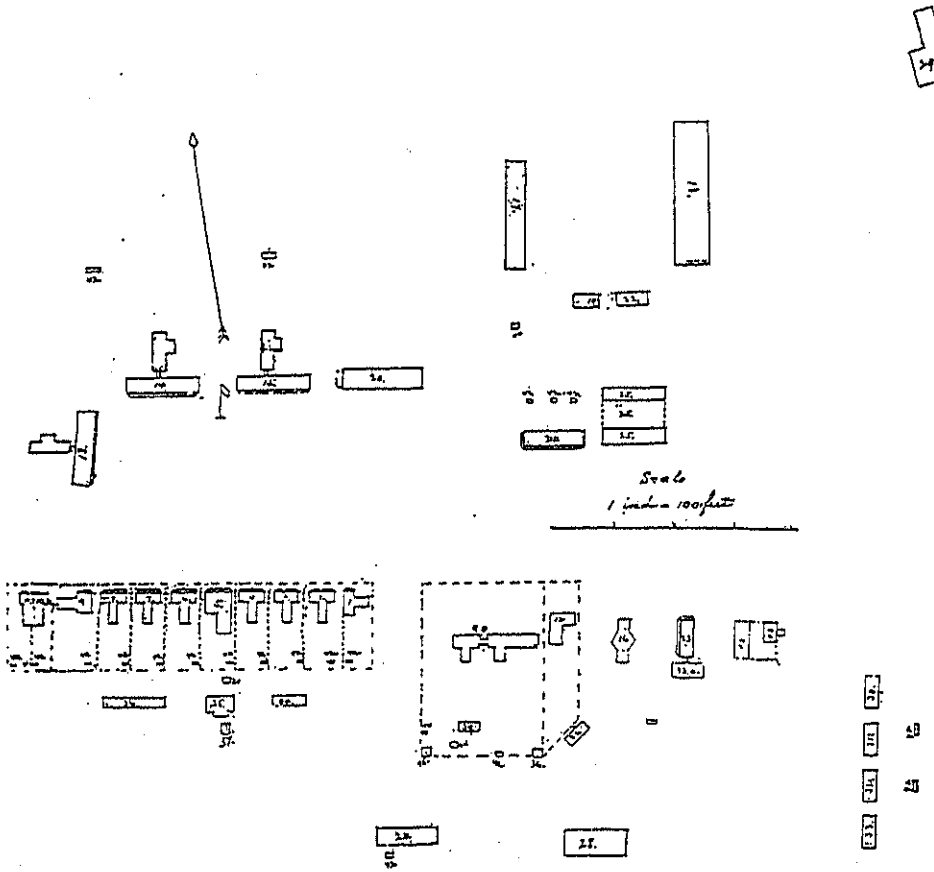
Figure 12. 1879 (Adjutant General's Library) military plan of Fort Hays showing flagpole centered at north edge of parade ground.



1	Commanding Officers Quarters	5	Commissary Storehouse	9	X [unidentified on original plan]	29	X [unidentified on original plan]
2	Officers Quarters	6	Quartermaster's Storehouse	10	Bakery	30	Surgeons quarters
3	Company Messhouse, Kitchen, Wash house	7	Quartermaster's Office	11	Blockhouse used as grain house	31	Post Traders Store and quarters
4	Company Quarters	8	Hospital	12	Guardhouse & Ordnance room	32	Icehouse

13	Saw mill
14	Coal house
15	Stables
16	Deadhouse
17	Workshops
18	X [unidentified on original plan]
19	Q. Masters employee's quarters
20	Quartermaster's Stables
21	Laundresses quarters
22	Wells
23	[omitted on original plan]
24	Hay yard
25	Sinks
26	Library - reading room and chapel
27	Headquarters
28	Cavalry Corral

Figure 13. Circa 1880-1885 (Ellis) military plan of Fort Hays showing flagpole centered at north edge of the parade ground.



1,2,3,4,6,7,8,9,10	Officer's Quarters	16	Headquarters building (Blockhouse)	20	Commissary building	42	Sinks
5	Commanding Officers' Quarters	17	Q.M. Stables	21	N. C. S. Teamsters	43	Traders establishment
12	Surgeon's Quarters	18	Cavalry Stable	22	Carpenters shop	44	Wells
13,14,15	Company Barracks	19	Teamsters Qrs. & Blacksmith shop	23, 23a	Band quarters, Library & Post schoolhouse	45	Mortuary

24	Laundresses
25	Q. M. Storehouse
26	Bakery
27	Ice house
28	Coalshed
29	Old Forage house
30,31,32,33	Married Soldiers Quarters
34,35,36	Officers Stables
37	Upper Tank & windmill
38	Lower Tank & windmill
39	Stewards Quarters
40	Post Hospital
41	Hay yard

Figure 14. Circa 1885-1889 (USQG) military plan of Fort Hays showing flagpole centered at north edge of the parade ground.

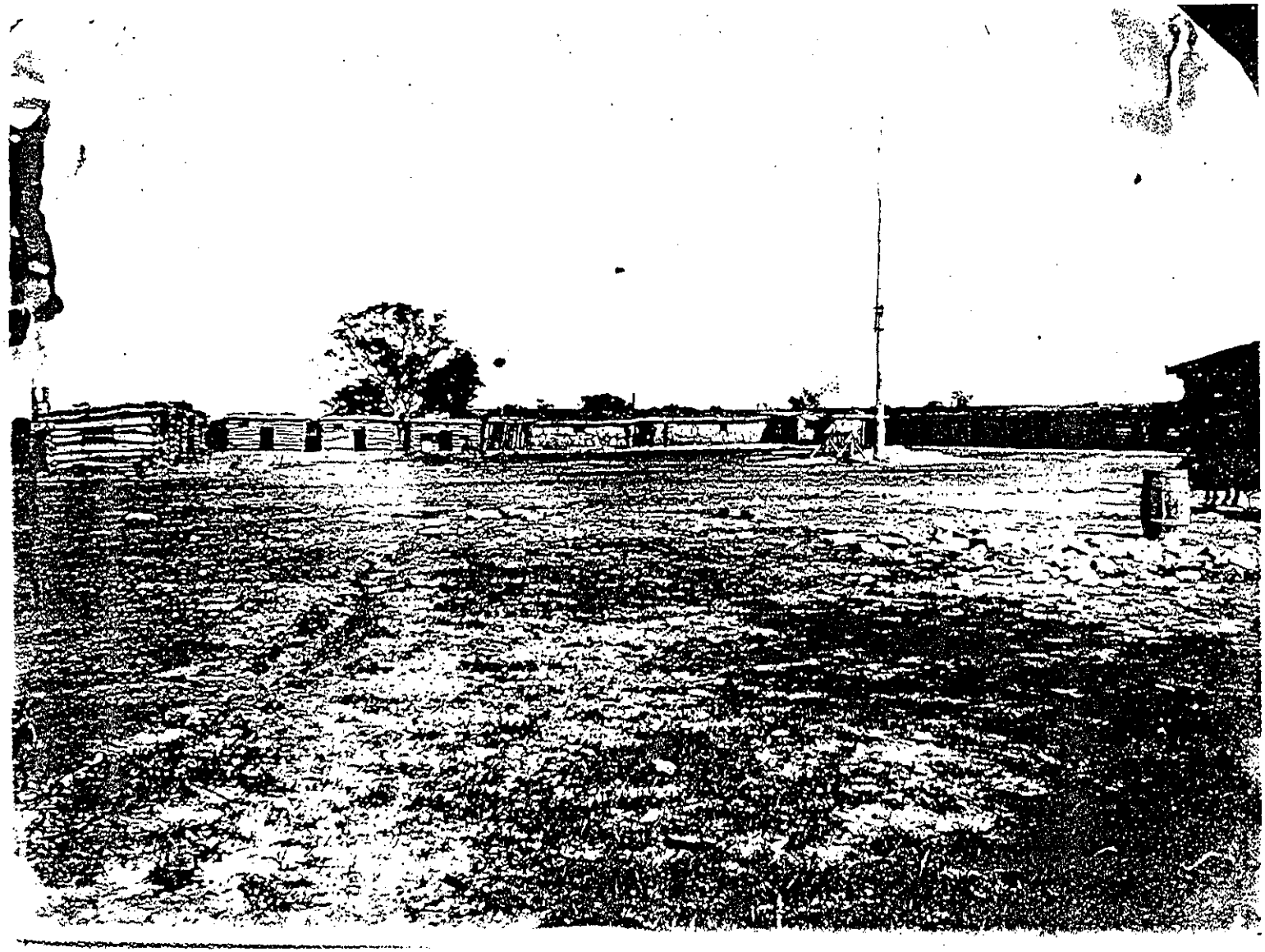


Figure 15. 1867 (KSHS) Photograph of flagpole at the old site of Fort Hays after the post was damaged by flooding and moved, showing flagstaff construction.

Figure 16. 1869 (KSHS) photograph of Fort Hays flagpole centered at north edge of the parade ground, showing flagstaff construction.

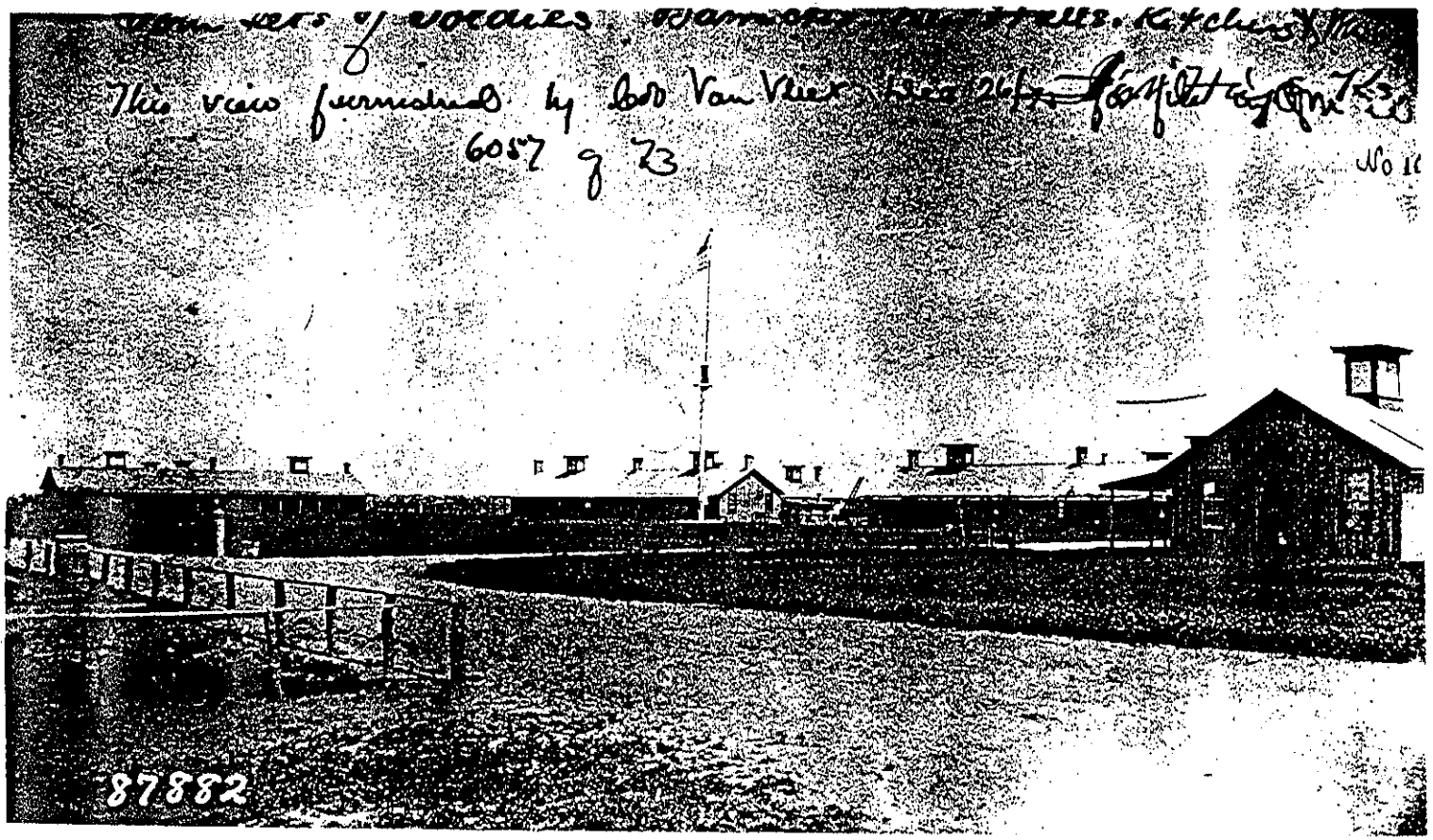


Figure 17. 1873 (Van Vliet) Photograph of Fort Hays flagpole centered at north edge of the parade ground, showing flagstaff construction.

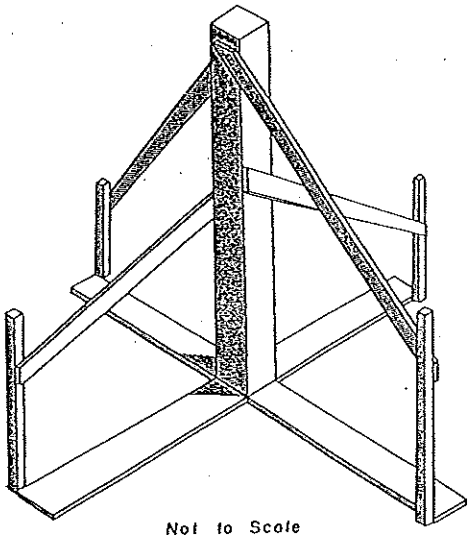


Figure 18. Reconstruction of the subterranean support system of the flagstaff base at Fort Larned, Kansas (Hunt 1983).

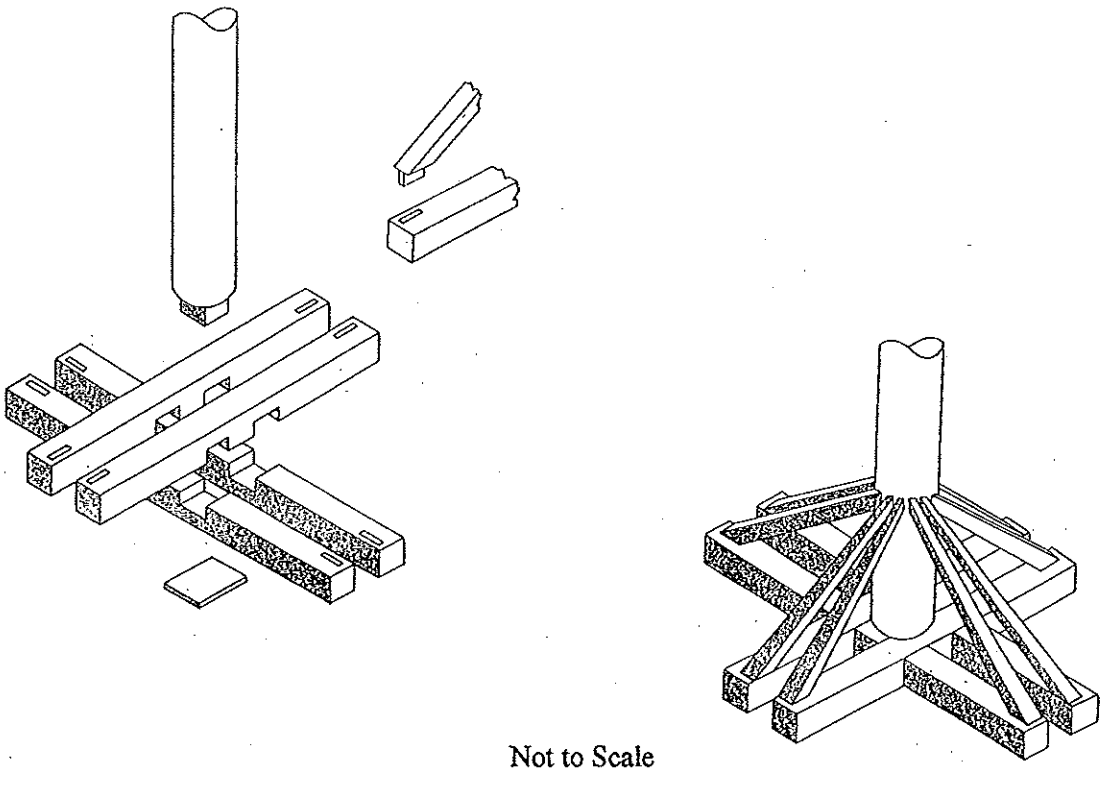


Figure 19. Reconstruction of the semi-subterranean support system of the flagstaff base Ft. Smith, Arkansas, exploded detail (above) and view with angled braces attached (below) (Coleman 1985).

flagstaff base was also found at Fort McHenry, Maryland, and is a typical method of military flagpole or "mast" construction.

THE SEARCH FOR THE FORT HAYS FLAGPOLES

Preliminary testing to locate and document the two flagpoles at Fort Hays was conducted on the parade ground in two episodes. Society staff archeologist Martin Stein and Cottonwood Ranch site curator Don Rowlison worked on the parade ground from October 8-10, 1996, and again from October 13-15, 1997. Based on the documentary evidence, they focused their investigations on two general locations, the center of the parade ground and the center of the north edge of the parade ground. Construction of the U.S. 183 Highway Bypass destroyed a portion of the post north of the parade ground. The modern highway roadbed, which curves in this vicinity, is approximately 10 ft below the grade of the parade ground. Highway construction contouring the highway shoulder in a gentle slope apparently caused the destruction of the archeological remains of the barracks on the north side of the Fort Hays parade ground. Unlike the enlisted barracks on the west side of the parade ground, which have been located and outlined, the exact location of the two northern barracks, which would have provided valuable reference points, cannot be determined (Stein 1997:5-6).

The methods used during this investigation involved examining both visible surface irregularities and specific locations on the ground based on measurements taken from historic maps. Subtle changes in elevation and differences in vegetation were examined using archeological techniques. All of these visible anomalies proved to be places of previous disturbance post-dating the military occupation of the fort. Much of the disturbance on the parade ground was caused by an old road that ran at an angle across the parade ground and concrete slabs and other features associated with the old roadside park and picnic area. In the absence of the northern barracks for reference, all measurements were made from buildings or outlined foundations along officers' row. Another problem encountered was the unknown amount of distortion introduced through photocopying of old maps. To account for this distortion, the size of the areas tested were intentionally made larger (Stein 1997:6).

The techniques employed by Stein and Rowlison included probing with solid rods, taking core samples of the soils using hand-held Oakfield coring tools, excavation of small shovel test units and larger test excavations, and using a truck-mounted Giddings drill to take continuous core samples to a maximum depth of 10 ft (Figure 20). Testing during 1996 was limited to hand tools, while the 1997 fieldwork included both hand and machine coring. The goal of the core tests was to identify any soil disturbances resulting from excavation of a hole for the base of the flagpole. It was assumed that any hand-dug excavation which reached any significant depth would have required a sizeable hole in its upper dimensions to provide working room for the excavators (Stein 1997:6-8).

For this research effort, Stein and Rowlison designated the parade ground as Area 961, and smaller portions within the parade ground were designated as test areas 1-5. Four test areas were examined during 1996. Test Area 1, which was pointed out by Curator Bob Wilhelm, consisted of a small area of rock debris visible on the ground surface southwest of the bison statue. Systematic probing within a 5 x 8 m (16.4 x 26.2 ft) area around the rock debris encountered a linear pattern of stones in a "T"-shape. Three shovel tests were excavated in this vicinity (Tests A, B, and C). Testing showed that the rock rubble was a shallow deposit with a possible associated posthole. This shallow disturbance appeared to post-date the fort occupation. Based on measurements from the 1879 map, Test Area 2 was situated in the vicinity of the replacement flagstaff at the north end of the parade ground. Distances to this flagstaff were measured from the southern corner post of the parade ground, the west side of the Commanding Officer's Quarters, and from the western enlisted barracks. These measurements indicated that the north edge of the parade

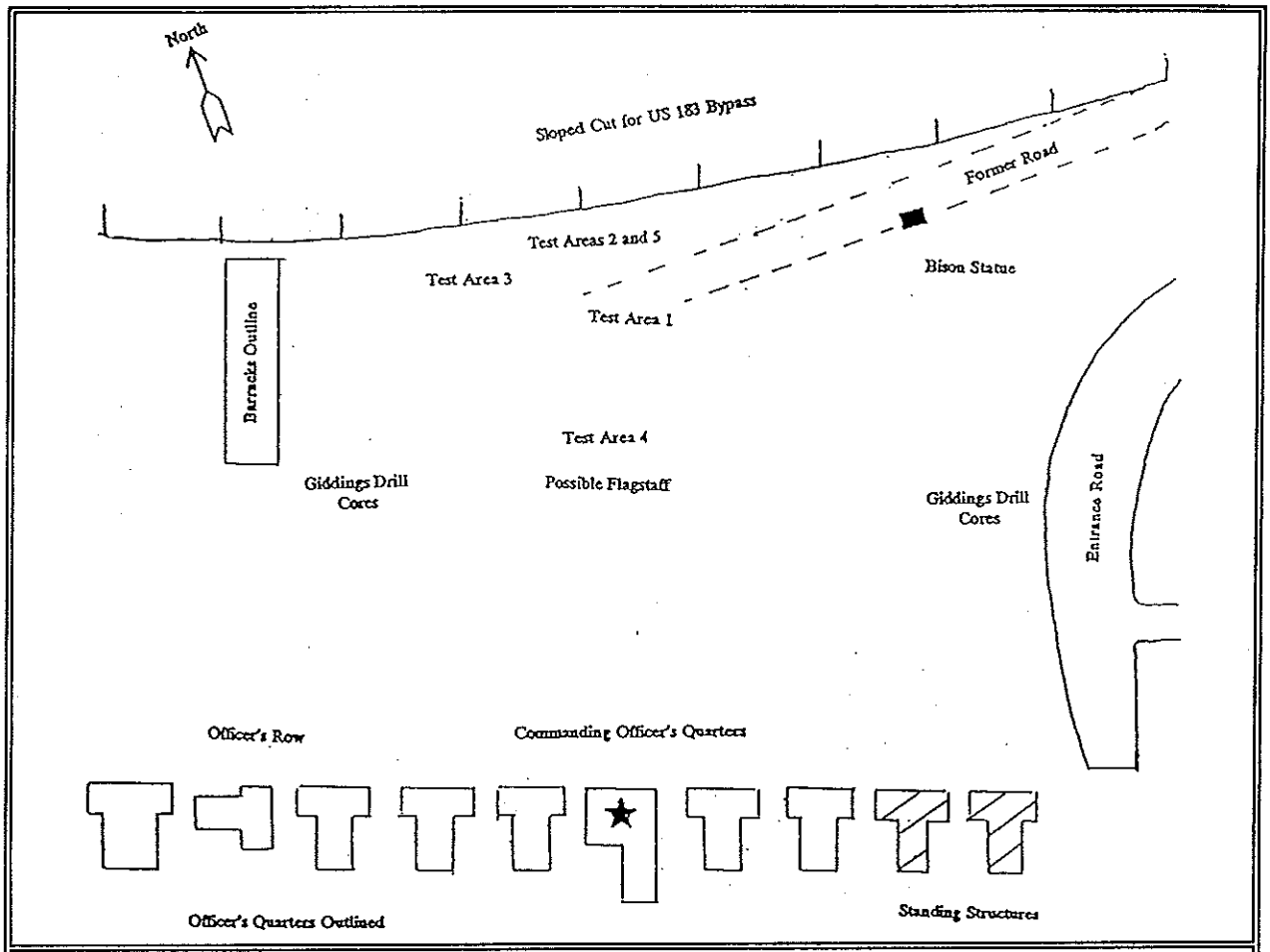


Figure 20. Locations of 1996 and 1997 archeological testing for the flagpoles on the Fort Hays (14EL301) parade ground (Stein 1997:10).

ground was located immediately adjacent to the modern highway shoulder cut. This area was approximately 8 m north of Test Area 1. Oakfield core samples, taken at 1-m (3.3 ft) intervals within a 7-m (23-ft) square grid, encountered undisturbed soil profiles. Test Area 3, located southwest of Test Area 2, was examined due to its lack of vegetation. A solid feature (F#2169) was encountered and a portion was revealed through excavation of two excavation units, one measuring 100 x 90 cm (3 ft-6 in x 2 ft-11.5 in) and the other 50 x 34 cm (1 ft-8 in x 1 ft-1 in). The feature consisted of a domed concrete structure, a vertical concrete wall, limestone rubble, a board and wood fragments, and a few artifacts. It measured 165 x 155 cm (5.5 x 5 ft) and was obviously related to the post-military occupation of the site. Since F#2169 was clearly not related to the flagpole, further excavation to determine its dimensions and function were postponed to a future date. Test Area 4, located in the middle of the parade ground, was located from the two posts marking the southern corners of the parade ground and measurements based on the 1879 map. An "X"-shaped pattern of Oakfield soil cores were taken at 1-m intervals. Mottled soils were noted from samples taken within a small depression situated 2 m (6.5 ft) west and 50 cm (1 ft-8 in) south of the center of the parade ground. Three of the four small test units excavated in this vicinity failed to find evidence of soil disturbance or fort-period artifacts. Mottled and disturbed soil was encountered to a depth of 30 cm in the fourth test (Test C) and coring through the bottom of this unit indicated that the disturbed soil continued to a depth of at least 112 cm (3 ft-8 in)bgs (below ground surface). This feature was identified as F#2170. (Stein 1997:6-9).

During 1997 Stein and Rowlison excavated additional Oakfield soil cores and also used a truck-mounted Giddings drill, provided by the Hays Area Office of the Natural Resources Conservation Service (NRCS) office and operated by Tim McDowell. The Giddings drill took 1½-in diameter core samples to a maximum depth of 10 ft. Test Area 5, located in the north central portion of the parade ground partially overlapping Test Area 2, was examined using 107 Oakfield core samples at 40-cm (15.7 in) intervals within a 6 x 12 m grid (19.7 x 39.4 ft). The soil profiles from the Test Area 5 cores did not encounter disturbed soils. A total of 54 Giddings drill cores were taken during this phase of testing, the majority to a depth of 120 cm (3 ft-11 in) bgs. These core samples were taken from center points along the north, south, east, and west edges and from the approximate center of the parade ground. Two cores were made in F#2170, the mottled soil feature noted in 1996 in Test C within Test Area 4. These cores confirmed that the maximum depth of this feature was 120 cm. All 23 machine-assisted soil cores taken along the north edge of the parade ground, within Test Areas 2 and 5, indicated only undisturbed soil profiles. Six Giddings drill cores taken on an east-west line along the west edge of the parade ground found no soil disturbances. All four soil cores taken along the east edge of the parade ground showed undisturbed soil profiles. A single core was taken from a shallow depression north the a swale in front of the Commanding Officer's Quarters, but it also showed no evidence of disturbed soils. Sixteen Giddings drill cores were taken in an "X"-shaped pattern around the center of the parade ground, as measured from the buildings and foundation outlines along officers' row. All 16 cores showed an undisturbed soil profile. Two Giddings drill cores were taken from an area slightly south and west of the measured center of the parade ground with sparse vegetation cover and somewhat darker soil color. The first of these two cores showed mottled soil to a depth of 104 cm (3 ft-4 in) bgs. The second core, placed 70 cm (2 ft-3.5 in) east of the first, reached a depth of 300 cm (9 ft-10 in) bgs with mottled soil along the entire length and fragments of wood at 70 cm (2 ft-3.5 in), 155 cm (5 ft-1 in), and 260 cm (8 ft-6 in) bgs (Stein 1997:9-10).

Based upon examination of hundreds of hand and machine-assisted soil cores from various portions of the parade ground, Stein (1997:11) concluded that the best evidence for the remains of a flagstaff at Fort Hays was found near the center of the parade ground. The 10-ft deep filled hole containing disturbed soils and wood fragments was considered the likely location of the fort's original flagpole in the center of the parade ground. The lack of disturbed soils to any significant depth along the north edge of the existing portion of the parade ground, or along the sloping highway shoulder, strongly suggested that evidence of the flagstaff at the north end of the parade ground had been destroyed by highway construction.

1998 EXCAVATION OF THE FLAGPOLE BASE

Archeological excavations were conducted at Fort Hays State Historical Site (14EL301) between September 19 to October 1, 1998, using volunteer workers under the direction of Society archeologist Marsha K. King. Investigations focused on one of dozens of 1½-inch diameter Giddings drill core tests taken at the site during preliminary testing conducted in 1997 by Stein and Rowlison. This particular core test extended to a depth of 10 ft through disturbed soils and encountered wood at four levels between 70 cm (2 ft-3 in) 300 cm (9 ft-10 in) bgs.

Several issues were considered prior to excavation of the flagpole feature near the center of the Fort Hays parade ground. Since archeology is a destructive science, and since the site is preserved as a state historic site, it was determined that, if at all possible, at least part of the flagpole feature and any intact buried structural elements should be left intact on the site. It was decided that as the feature was thought to represent a single episode of excavation, construction, and refilling which occurred over a short period, that tight controls on excavation levels would not be required unless natural strata were observed. In the absence of natural strata, the use of arbitrary 50-cm (19.7-in) levels were selected, providing some control over the vertical distribution of artifacts or structural elements. The best methods for recording the

feature were also considered. The angle of the autumn sun was considered in deciding where to bisect the feature and which portions to excavate, to allow for the best visibility of cross-section walls for photographic recording and profiling. Another important issue considered was safety. Since the Giddings drill core test had indicated that the disturbed soil feature extended to a depth of at least 10 ft, it was realized that trenching standards enforced by the Occupational Safety and Health Administration (OSHA) would need to be followed in order to safely excavate to such a depth. This entailed stepping the excavations, removing loose backdirt from the edges of the unit, providing access and egress routes (a ramp, steps, and a ladder), and generally creating a safe work area around the deep unit. A small backhoe and operator, Ron Rice, were provided for the project by the City of Hays Parks Department. As excavations intensified the backhoe visited the site more frequently keeping the work area within OSHA standards. The basic methods employed in the excavation of the flagpole feature took all of these considerations into account.

The first step of the 1998 testing was to relocate the deep 1997 core test near the center of the parade ground. Since Stein and Rowlison had marked the deep test by burying several flagging pins and an aluminum root beer can near the top of the hole, a metal detector was used to find the core test (Figure 21). This was easily accomplished.

Four trenches, each extending outward from the deep 1997 Giddings drill core test, were excavated in an effort to define top and horizontal extent of the disturbed soil, identified as Feature #981 (Figure 22). Though referred to by cardinal directions, these trenches, which were aligned at approximate right angles to each other, were not oriented in cardinal directions. The hand excavated trench referred to as the "HT-North" was actually oriented at 50° and extended 2 m (6.5 ft) from the deep core test. Similarly, "HT-East" was aligned at 140° and was 2.1 m (6.9 ft) long, "HT-South" was oriented at 230° and was 3 m (9.8 ft) long, and "HT-West" was aligned at 320° was 3.1 m (10.2 ft) long. The four hand trenches were initially excavated through the sod to a depth of approximately 13 cm (5.1 in) bgs. Subsequently, they were taken down to a depth of approximately 50 cm (19.7 in) bgs and leveled off. Artifacts recovered from these two upper levels (0-13 cm and 13-50 cm) were bagged separately, but both were considered to lie above the top of the feature. They will be discussed in greater detail in a later section of this report.

The corners between the trenches were then removed, maintaining the arbitrary two level distinction. The soil was excavated back from the central core test carefully watching for changes in the soil texture and appearance which could indicate the exterior of the feature. An irregularly shaped excavation unit (X-981) was opened, measuring roughly 5 x 5 m (16.4 x 16.4 ft). The top of the disturbed soil feature (F#981), measuring approximately 2 x 2.5 m (6.5 x 8.2 ft), was exposed at 50 cm (19.7 in) bd (below datum). A site datum was established 4.4 m (14.4 ft) beyond the end of the "West Trench," away from the unit where it would not be impacted by subsequent excavations. A secondary site datum was also established at a point 4.5 m (14.8 ft) beyond the end of the "East Trench." This established a datum line which was helpful in mapping the feature and running a line-level to establish depths. A plan was completed showing the unit and the apparent horizontal boundaries of the feature at 50 cm bd (Figure 23).

Once the top of F#981 was defined at a depth of 50 cm (19.7 in) bd, an arbitrary line was established bisecting the feature. This cross-section line was laid out 30 cm (30.4 in) to the south of and parallel to the site datum line. The "south," actually southwesterly, portion of the feature was excavated to a depth of 150 cm (59.1 in) bd in two 50-cm thick arbitrary levels. Shortly after beginning excavation of the cross-section, a United States military uniform button was recovered at a depth of 58 cm (23 in) bd. This General Service style button, showing a right-facing eagle with spread-wings and a striped shield on his chest, was the standard button used by enlisted men from 1855 until 1884 (Brinckerhoff 1972:5). This artifact strongly suggested that the feature dated to the military occupation of the site. Other artifacts recovered from the upper levels of the feature fill (50-150 cm bd) included machine-cut nails, a bolt,

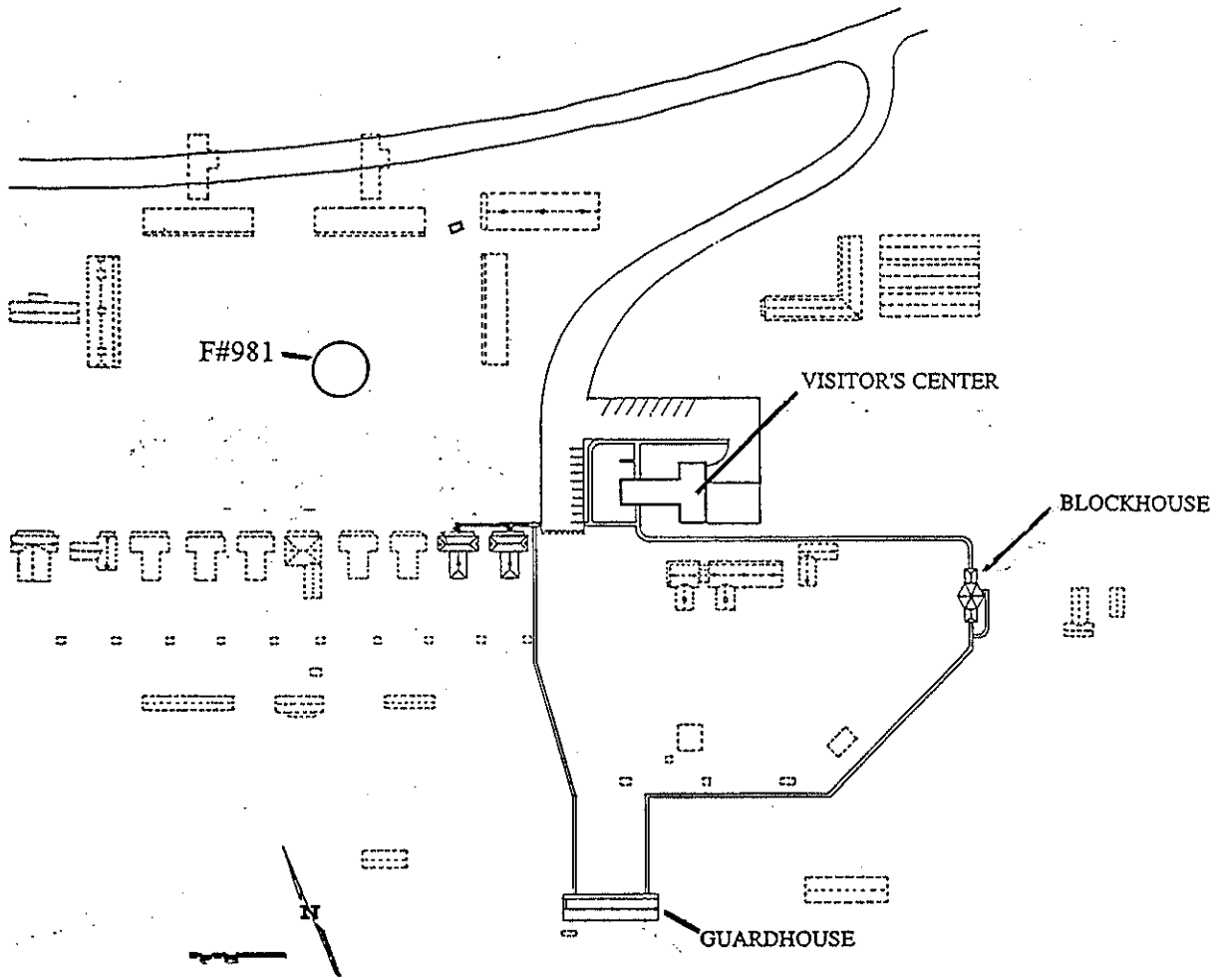


Figure 21. Plan of Fort Hays State Historic Site (14EL301) showing the location of the 1998 flag pole excavations on the parade ground

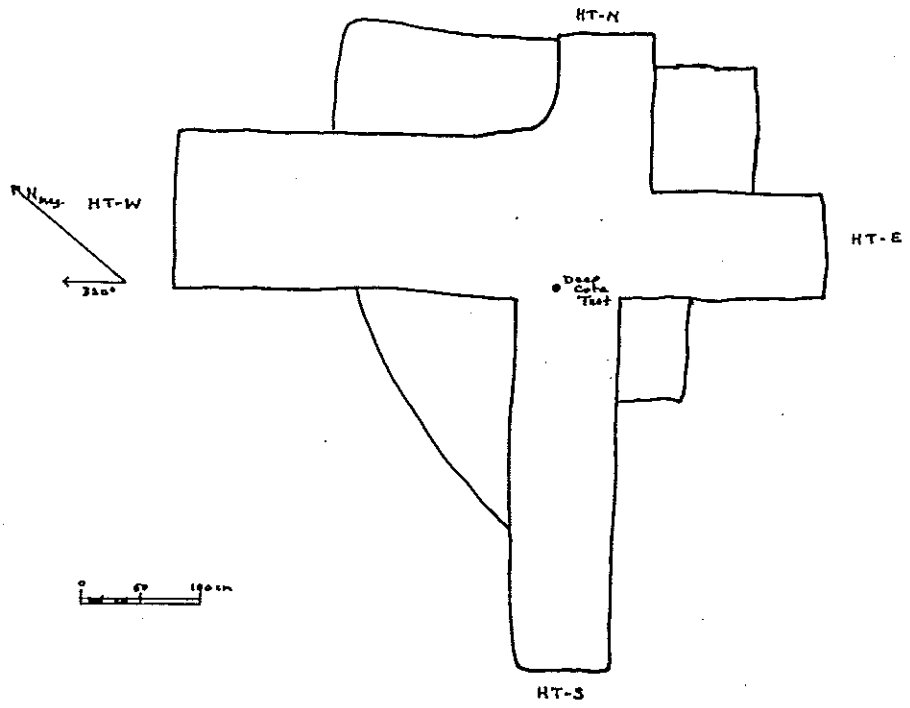


Figure 22. Plan showing HT-North, HT-East, HT-South, and HT-West extending outward from the deep 1997 Giddings drill core test in an effort to define top and horizontal extent of F#981.

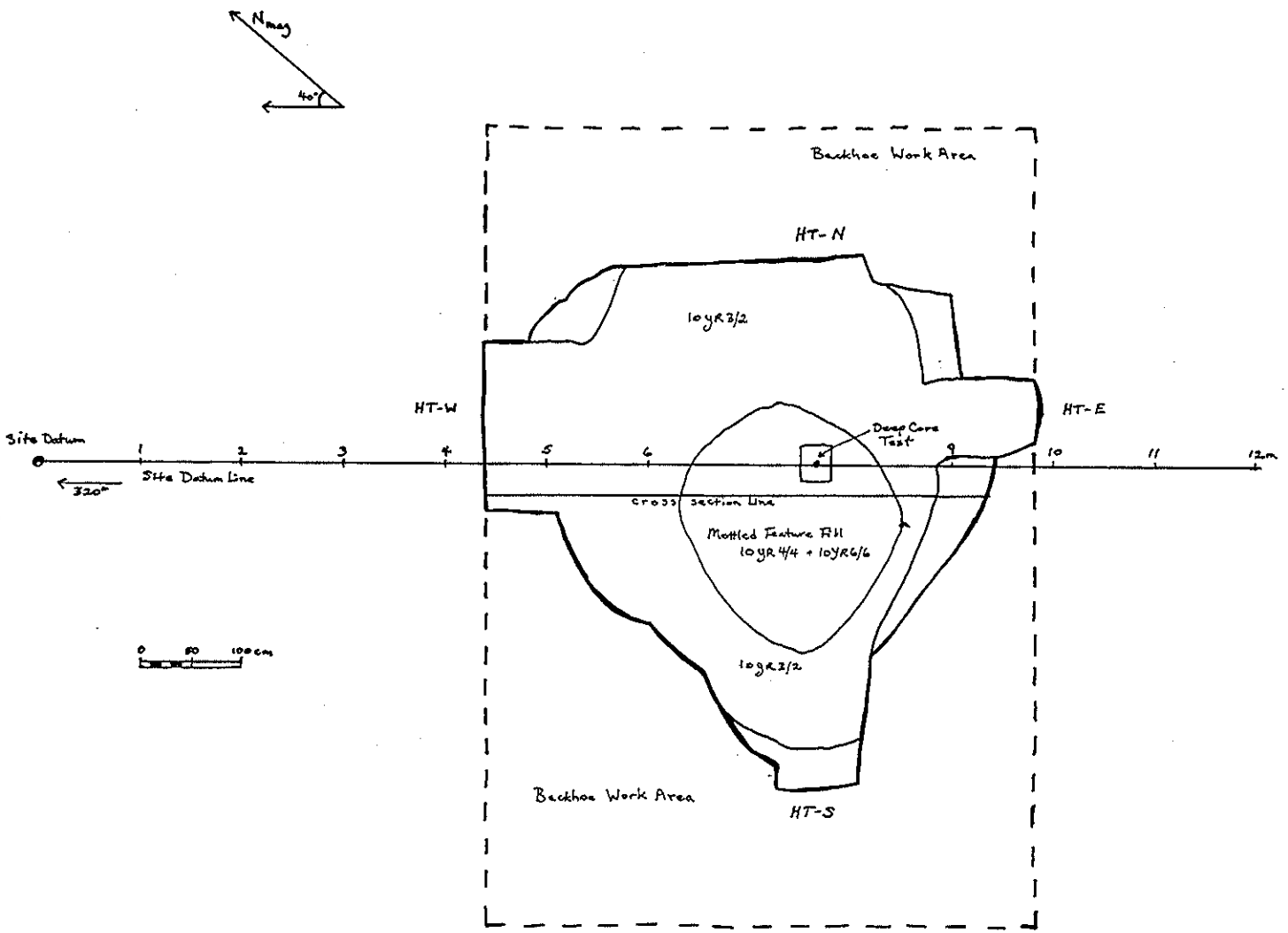


Figure 23. Plan of X-981 at 50 cm bgs after the corners between four initial hand trenches were removed exposing the top of F#981.

fragments of bottle and window glass, small pieces of coal, and numerous small fragments of wood. The edges of the feature were excavated carefully in an effort to determine the exterior boundaries of the disturbed and natural soils. During excavation of the 100-150 cm (39.4-59.1 in) level, a very fragile, heavily rotted, piece of wood was noted in the south portion of F#981 near the east edge of the feature fill at a depth of approximately 135 cm (53.2 inn) bd. This wood fragment, which had a roughly triangular cross-section, continued into the floor at the bottom of this level. A plan was drawn of the floor of the unit at this level (Figure 24) and the cross-section face, extending from 50-150 cm (19.7 in to 59.1 in) bd, was profiled (Figure 25). The extremely mottled fill soils within the feature, including a segment of wood plank and several smaller wood fragments, were clearly visible in the unit floor and profile.

For safety reasons, as excavations proceeded a backhoe was used to move backdirt away from the edges of the deepening unit, to maintain a safe work area adjacent to the hand excavations, and to cut a ramp and steps to improve access to the deeper levels. In order to limit disturbance to the parade ground and to retain as much provenience control as possible over the feature, backhoe excavation was limited to as small an area as was considered safe and was kept at the outer edges of the feature. Ron Rice, the backhoe operator, had a keen eye and found several artifacts while excavating to create and maintain the work area and access routes. Among the 23 items recovered during backhoe excavations were several fragments of a glazed stoneware ale or stout bottle, glass bottle sherds, two pieces of a broken clay tobacco pipe stem, the base of a heavy stemmed glass dish or snifter, and several machine cut nails. The most interesting artifact recovered from the backhoe excavations around the edges of the feature was part of an unfired cannon friction primer. This artifact was most appropriate since at most frontier military posts a cannon typically sat near the flagpole and was fired as part of various ceremonies at the fort.

Once the profile of the 50-150 cm cross-section face was completed, the north half of F#981 was excavated to the 150 cm (4 ft 11-in) bd level. As with the south half of the feature, excavation was conducted in two arbitrary 50 cm levels, 50-100 cm (19.7-39.4 in) and 100-150 cm (39.4-59.1 in) bd. The deep Giddings drill core test hole, which continued to be used during excavation as a point of reference, was located in the north half of the unit. Pedestaled during previous stages of excavation, the soil was carefully removed during excavation of this level and artifacts were bagged with their appropriate provenience. The core test hole was marked with a flagged chaining pin and pin flags to make this reference point clearly visible. During excavation of the 100-150 cm bd level in the north half of F#981, the upper piece of wood penetrated by the Giddings drill core test was uncovered. It proved to be only a short board fragment lying horizontally amid the feature fill.

Careful examination of the unit walls and floor at the bottom of this level indicated that the disturbed soil of the feature extended further to the west, north, and east than initially believed. The unit walls were cut back from approximately 20-50 cm (7.9 to 19.7 in). The only artifact recovered during this stage of the excavation was a complete white clay tobacco pipe. Unfortunately, the pipe stem was broken during excavation, but both halves were retrieved. A dark colored material was noted within the pipe bowl, possibly the residue of the final pipe contents. In order to preserve the residue, the pipe bowl was not cleaned. The bowl and residue were sent to Mary Adair for analysis of the residual material. It was assumed that this would prove to be standard tobacco that could have been easily acquired by soldiers from the post trader or merchants in Hays City. Dr. Adair's analysis presented in Appendix B and discussed with the analysis of the recovered artifact assemblage.

Soon after excavation began in the north half of the feature on the 150-200 cm (59.1-78.8 in) bd level, a change in the soil was noted in portions of the unit. At a depth of approximately 170 cm (67 in) bd culturally-sterile, lighter-colored, unmottled, dense silty sandy clay subsoil was present in the northwestern and northeastern portions of the unit. When loose soil was removed and the north half was troweled to a depth of 175 cm (68.9 in) bd, clear distinction was noted between the mottled feature fill and the sterile

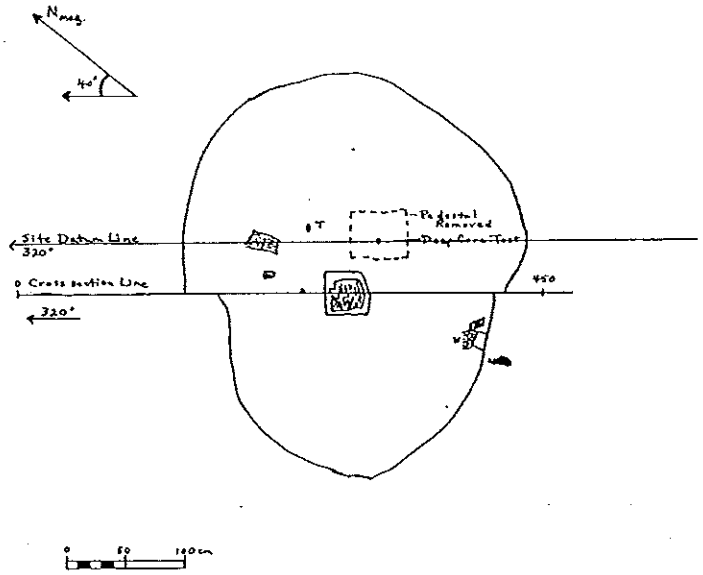


Figure 24. Plan of south and north halves of X-981 at 150 cm bd, showing mottled fill soils and wood fragments within F#981.

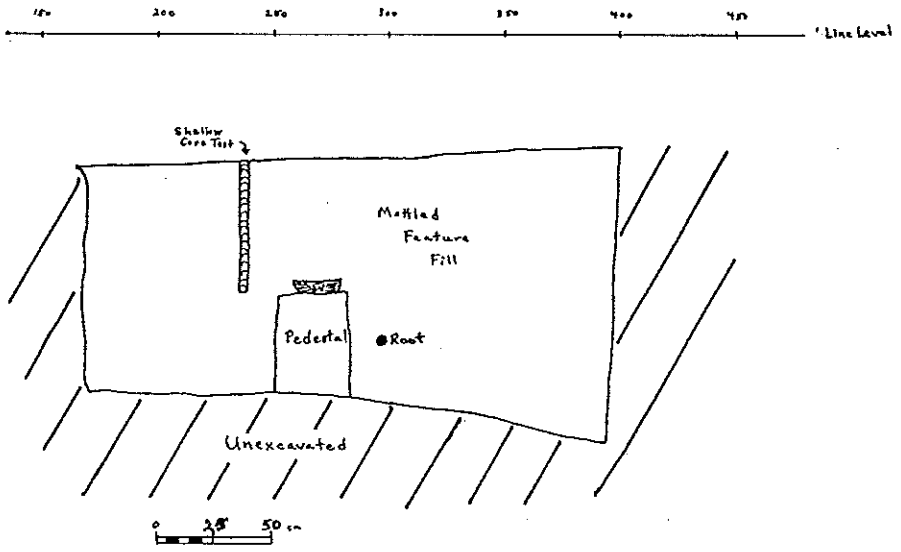


Figure 25. Profile of the north cross-section face, 50-150 cm bd, showing extremely mottled fill soils and wood fragments within F#981.

subsoil in both the floor and walls of X-981. The dark mottled feature fill clearly continued into the walls and beyond the limits of the excavation unit. Excavation in the north half was halted and the south half of X-981 was taken down and cleared off at the 175 cm bd level. The walls of X-981 were cut back slightly and troweled to more clearly show the differences in the feature fill and sterile subsoil. Three narrow trenches of dark mottled fill were visible extending into the westerly, northerly, and easterly walls of the unit, and were recorded on a plan of unit at 175 cm bd (Figure 26). These mottled trenches were referred to as the "West," "North," and "East" trenches, not to be confused with the hand trenches used briefly to determine the top of the feature. No clear evidence of a fourth or "South Trench" was visible in the floor at this depth., and the southerly portion of the unit walls had been removed previously by the backhoe to provide a work area and access ramp. The three visible trenches were further documented in a continuous profile of the 50-175 cm portion of the walls of this roughly-circular unit (Figure 27). This wall profile began approximately 50 cm (19.7 in) south of the southerly edge of the "West Trench" and continued in a clock-wise direction around the unit to a point 20 cm (7.9 in) south of the "East Trench."

Close examination of the wall profile and plan indicated that with the exception of the three narrow trenches, the disturbed feature fill did not continue below a depth of 80-100 cm (31.5 to 39 in) bd. The upper disturbed soils, which extended an undetermined distance beyond the edges of the excavation unit, were interpreted as a relatively shallow (approximately 3 ft deep) basin. It was considered likely that the soldiers may have excavated this upper portion of the hole using an animal-drawn slip rather than by hand using picks and shovels. The disturbed soils continuing into the floor of the unit at the 175 cm (68.9 in) level were evidence of a deeper hole, probably hand-excavated, within this basin. The "West Trench" was actually aligned to the northwest at an angle of 298° and at this depth was 60 cm (23.6 in) wide. The narrowest of the three trenches was the "North Trench," measuring only 45 cm (17.7 in) wide. It was oriented at a 34° angle. The "East Trench," which was actually aligned at 118°, was 80 cm (31.5 in) wide.

Due to the presence of the three mottled trenches, a new cross-section line was established. This new line, oriented northeast (118°) to southwest (298°), was selected in order to bisected the "West" and "East" trenches. Excavation continued on the southerly side of this line with removal of the 175-200 cm (68.9-78.8 in) bd portion of 150-200 cm (59.1-78.8 in) bd level. At a depth of approximately 188 cm (74.1 in) bd, a fourth trench, containing dark mottled feature fill, became clearly visible only in the unit floor. The unit walls in this area were cut back slightly to identify and clearly define the end of this trench. Referred to as the "South Trench," it was aligned at 212° and was 75 cm (29.6 in) wide. While backhoe excavation to the south of the feature had removed the wall area beyond this trench, the edges and end of this trench were well defined on the floor of the unit by the distinct difference between the mottled feature fill and the surrounding subsoil (Figure 28). The dense sandy clay subsoil appeared to be strong brown (7.5YR4/6) when moist, but dried to a light brown (7.5YR6/4) color.

Excavation of the 175-200 cm level in X-981 south of the new cross-section line continued after documentation of the "South Trench" was completed. The very rotted piece of wood near the east edge of F-981, that was first noted at a depth of approximately 135 cm bd, continued down at a steep angle toward the center of the feature fill. This badly rotted splinter of wood, which maintained a roughly "pie-shaped" cross-section, was pedestaled and left in the unit. Due to the presence of this pedestal adjacent to the cross-section face near the east edge of the feature, the "East Trench" was not completely excavated.

As excavation continued deeper, through the 200-250 cm (78.8-98.5 in) bd level, the central portion of the feature became noticeably smaller. The pockets of sterile subsoil, previously limited to the edges of the unit, expanded and encroached further into X-981. During excavation of this level the sterile subsoil beyond the edges of the feature fill were left unexcavated. The edges of the "West" and "South" trenches were distinctly outlined against the sterile subsoil encountered between them (Figure 29). The soil in both trenches became noticeably looser in this level, while the subsoil was very hard and compact. The

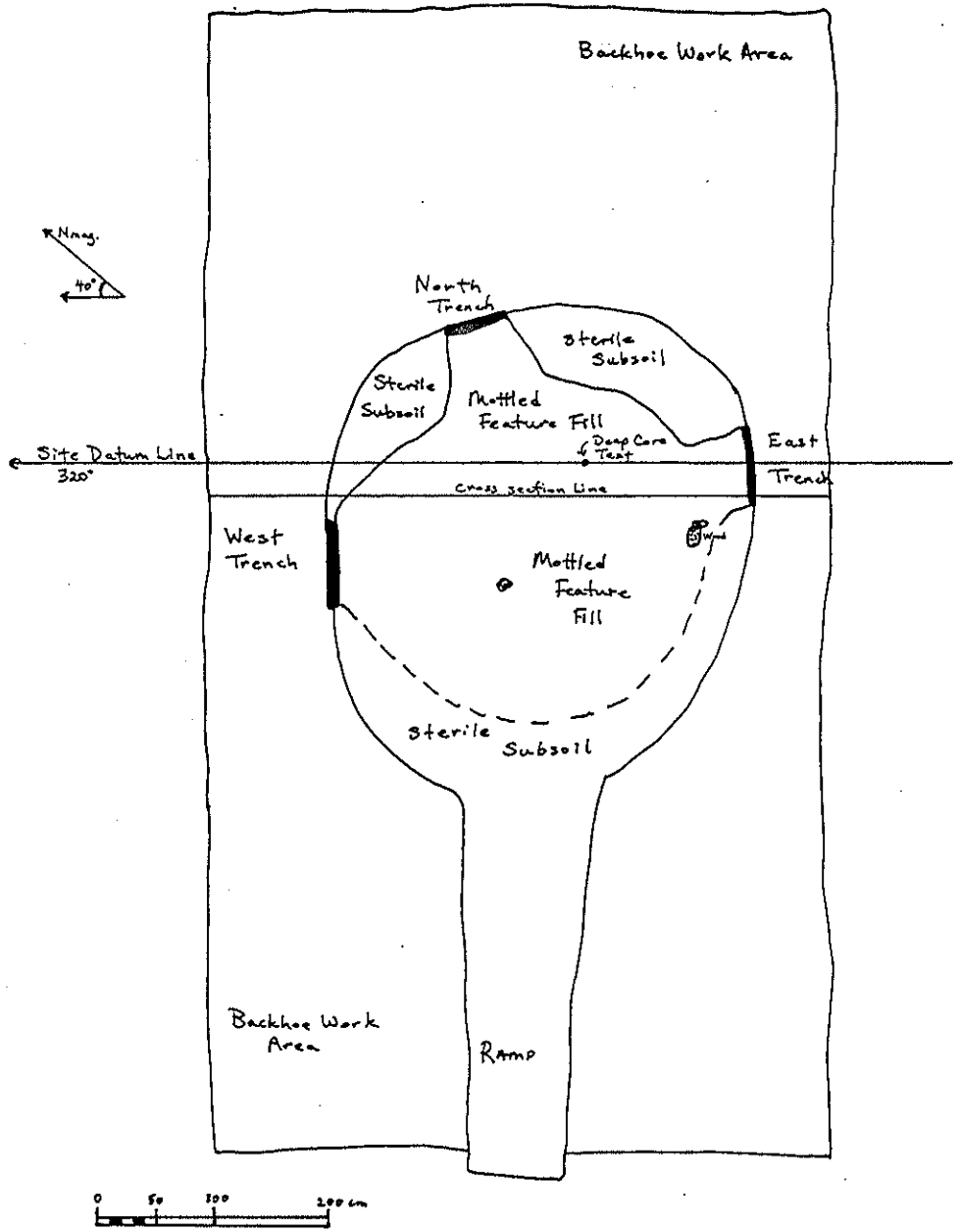


Figure 26. Plan of X-981 at 175 cm bd showing outlines of the "West," "North," and "East" trenches associated with F#981.

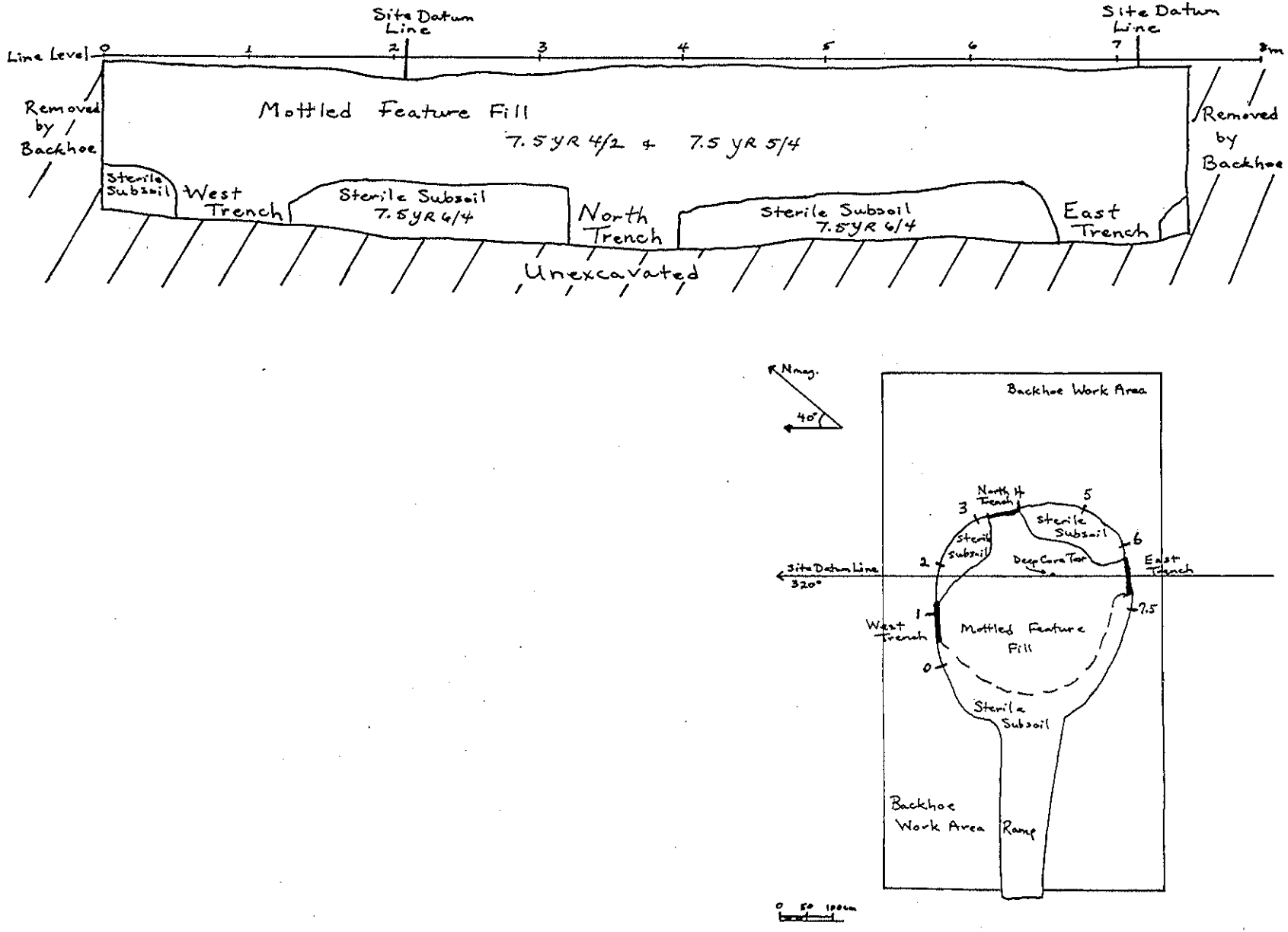


Figure 27. Continuous profile of the 50-175 cm portion of the walls of X-981 with feature fill and sterile subsoils showing depth of shallow basin and location of "West," "North," and "East" trenches [see inset plan for key to locations around feature edge].

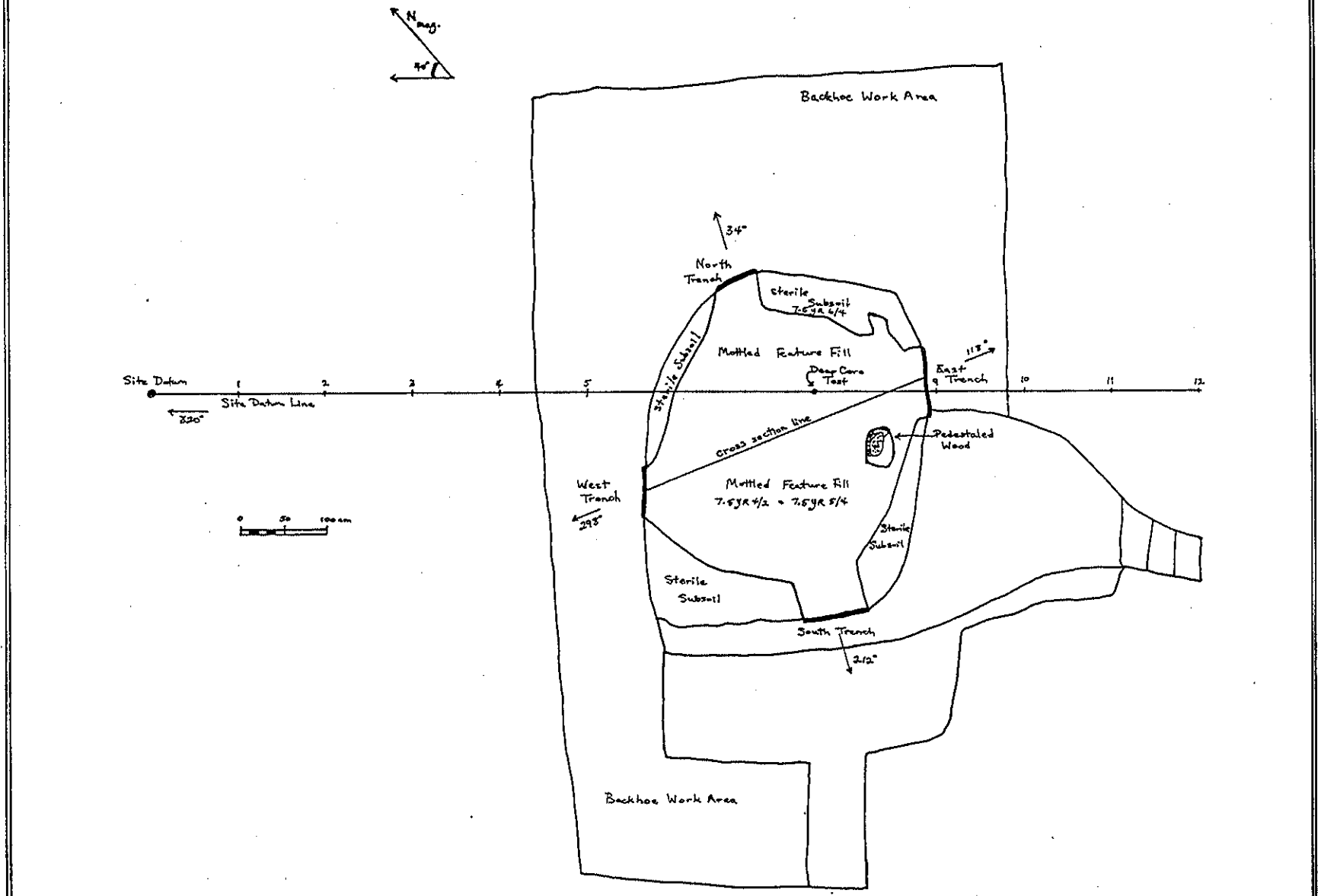


Figure 28. Plan of X-981 at 188 cm bd showing the outlines of F#981 and the four trenches.

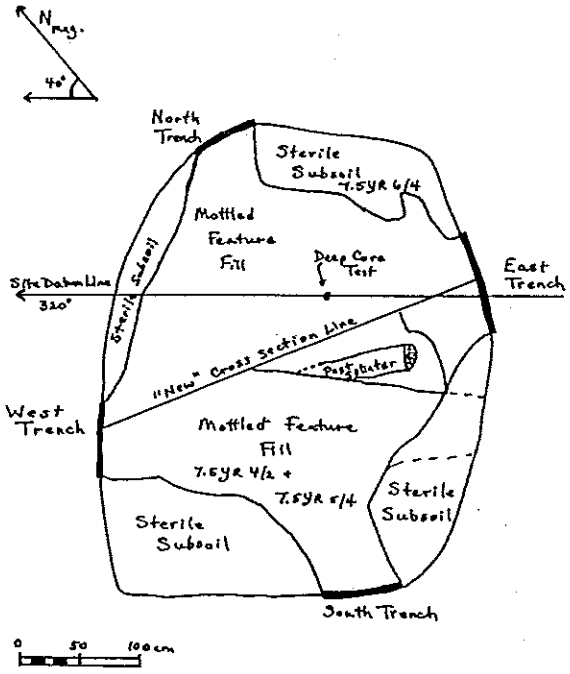


Figure 29. Plan of X-981 at 250 cm bd showing the diminished size of F#981.

pedestaled wood splinter continued through the level and into the unit floor. With the exception of numerous fragments of wood, very little cultural material was recovered from this level, consisting of only five items. One of these, a badly smashed lead bullet was recovered near the long angled wood fragment while troweling the east side of the pedestal.

During excavation of the 250-300 cm (98.5-118.2 in) bd level large quantities of jumbled wood fragments were recovered from the central portion of F#981 and in the "South Trench." No pattern or alignment of the wood was visible as the pieces varied considerably in size and were oriented at various angles and directions. The wood and surrounding fill soil in the "South Trench" appeared to have been disturbed, at least in part by rodent activity. Some of the wood fragments appeared to be pieces of heavy 2 x 8-in planks, others looked like pieces of 2 x 2s, and some were mere splinters. Sterile subsoil was encountered in the "South Trench" under the jumbled wood pieces at a depth of approximately300 cm (118.2 in or 9 ft-10.2 in). A 6 in-long portion of a heavy wood plank was present at the extreme southern end of this trench. This plank, which measured 15-in wide x 2.5-in thick, was lying flat on top of the subsoil with the wood oriented in the same alignment as the trench. No other solid intact wood elements were noted in the "South Trench." Excavation within the "West Trench" at this level revealed the presence of two wood planks oriented with the long axis of this trench and lying atop the sterile subsoil. The tops of these timbers were at a depth of 297 cm (117 in or 9 ft-9 in) bd. The west wall of X-981 and the cross-section face were both cut back approximately 15 cm (5.9 in) to expose the two timbers in the "West Trench." One plank was 25-cm (9.8-in) wide and the other was 28-cm (11-in) wide and both appeared to be approximately 6.4 cm (2.5-in) thick. The two planks had an overall length of approximately 1.6 m (5 ft-3 in), with 30 cm (11.8 in) of this length extending into the west unit wall. These two planks, though seriously decayed, were in much better condition than the wood recovered from the "South Trench." The wood furthest from the center of the feature was in the best condition, while near the center the planks were almost completely rotted through, leaving only a paper-thin stain to indicate their location. A plan of X-981 at 300 cm bd was produced showing the edges of the feature fill, the pedestaled wood splinter, and the wood planks and jumbled wood fragments remaining in the as yet unexcavated center of the feature (Figure 30).

Excavation continued below 300 cm bd to determine the bottom of the feature fill. Near the center of the unit, at the estimated junction of all four trenches, the mottled feature fill soil continued down to a maximum depth of 342 cm (134.7 in or 11 ft-2.7 in). The break between the feature fill and the sterile subsoil was clearly defined and was followed during excavation. A thin lens of coarse sand was encountered immediately above the sterile subsoil at the northerly end of the "South Trench." A roughly circular shallow depression in the subsoil was noted at the center of the four trenches directly beneath the end of the pedestaled wood pole fragment (Figure 31). The estimated diameter of this depression was 35 - 50 cm (13.8 - 19.7 in) and the maximum depth at the center was 342 cm (11 ft 3 in). No cultural material was recovered from this fill lens in the bottom of F#981.

The badly-rotted splinter of wood pedestaled in the south half of the feature ended at a depth of 277 cm (109.1 in or 9 ft-1.1 in). It was lying at an angle with the top to the southeast and the bottom 65 cm (25.6 in) above sterile soil in the center of the deepest part of the feature. At this point the end of the splinter was directly above the shallow depression at the bottom of F#981 (Figure 32). From where it was first noted during excavation at a depth of 135 cm to the end at 277 cm, this angled wood splinter had an overall length of approximately 195 cm (76.8 in or 4 ft-5 in). Wood fragments and soil stains in the vertical face on the west edge of the pedestal beneath the end of the wood splinter extended down into the shallow depression at the center of the feature. This indicated that an upright wooden post or pole had once been present in this location, and strongly suggested that the angled splinter was a fragment of the pole that originally rested in this depression. It appeared likely that when the flagpole was relocated to the north end of the parade ground the soldiers dug out the old flagpole, salvaged some of the wood, and dumped the

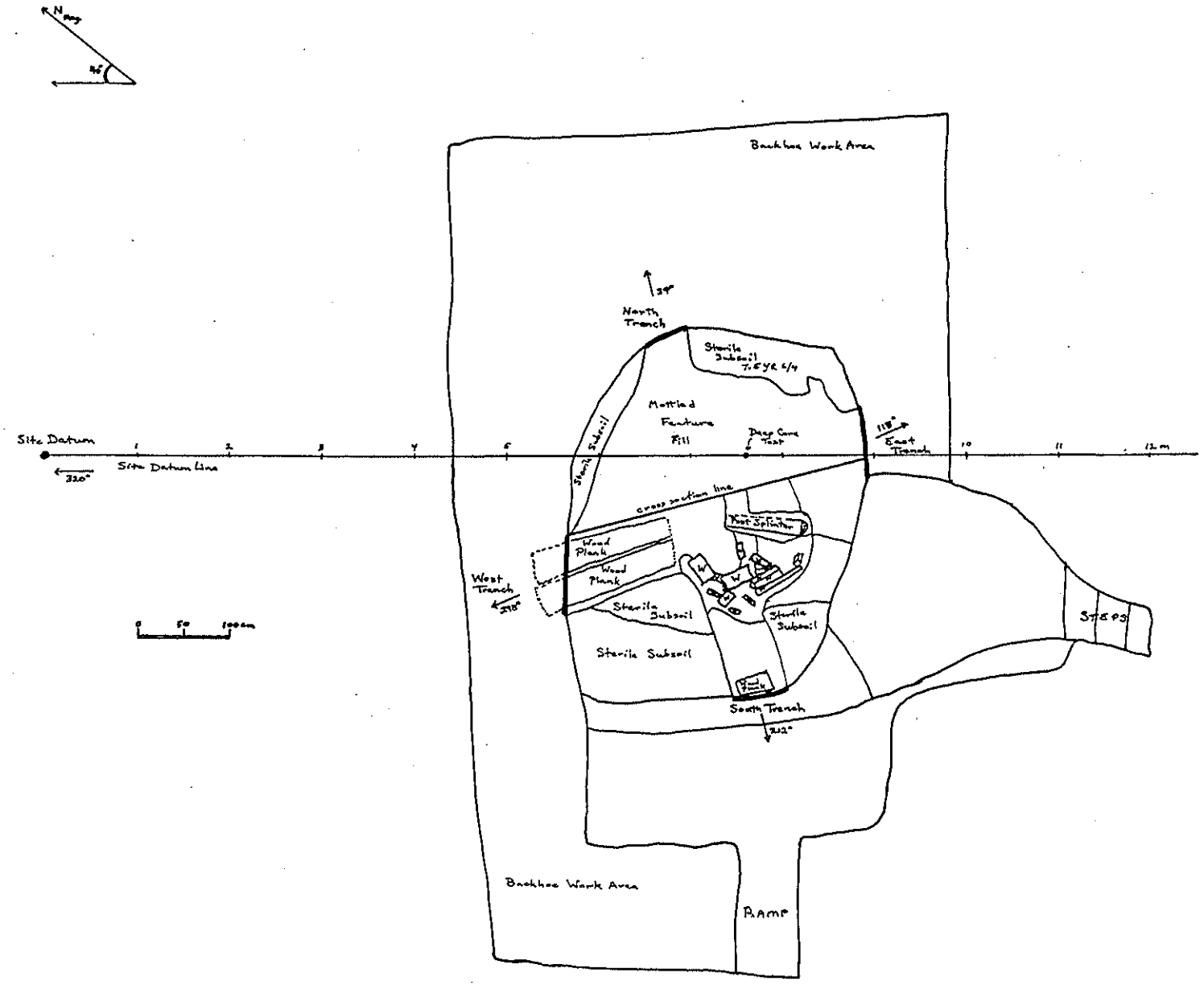


Figure 30. Plan of X-981 at 300 cm bd showing the edges of F#981 and wood planks in "West" and "South" trenches.

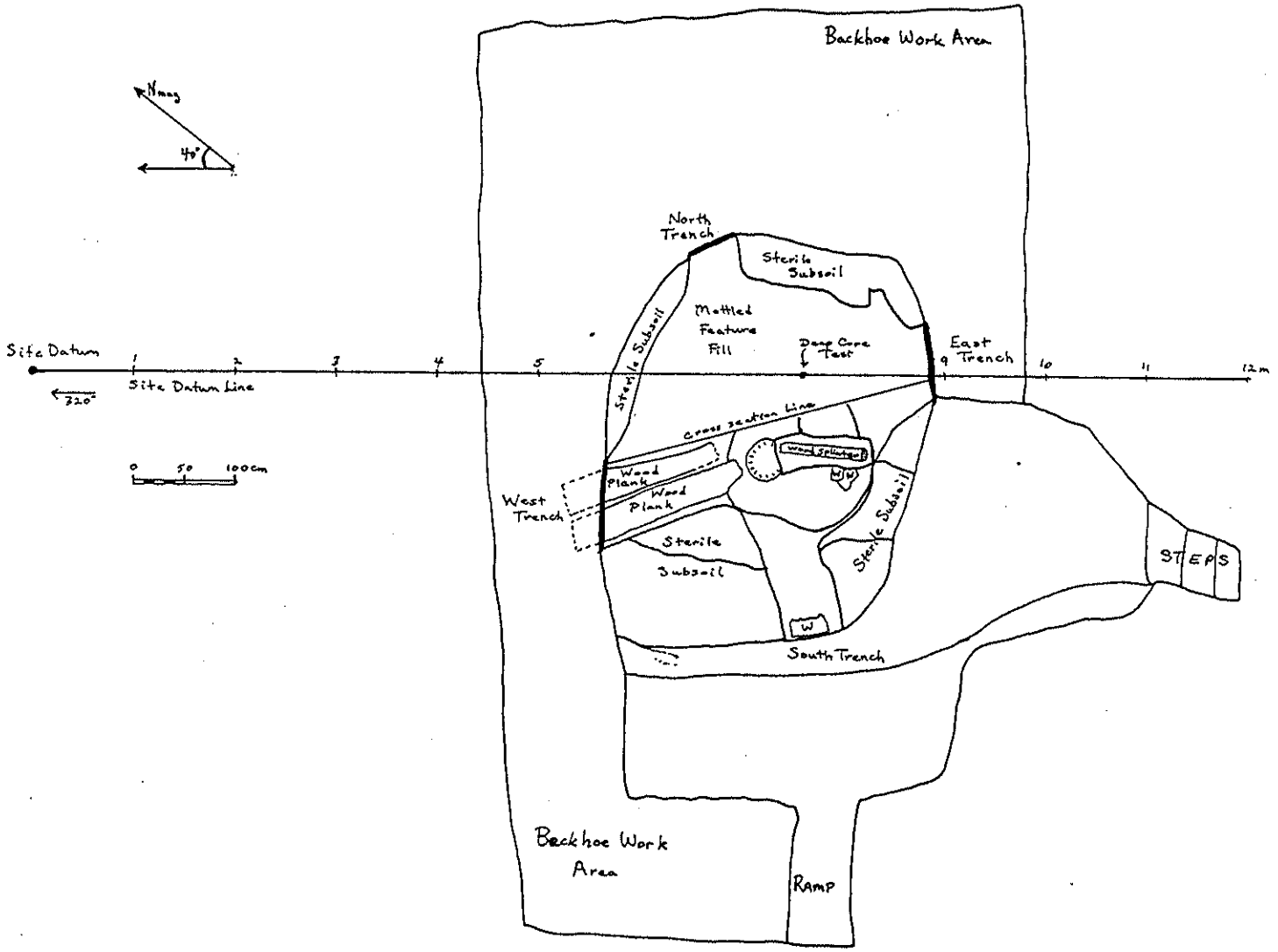


Figure 31. Plan of X-981 at 342 cm showing the roughly circular shallow depression in the center of F#981 directly beneath the end of the pedestaled wood pole fragment.

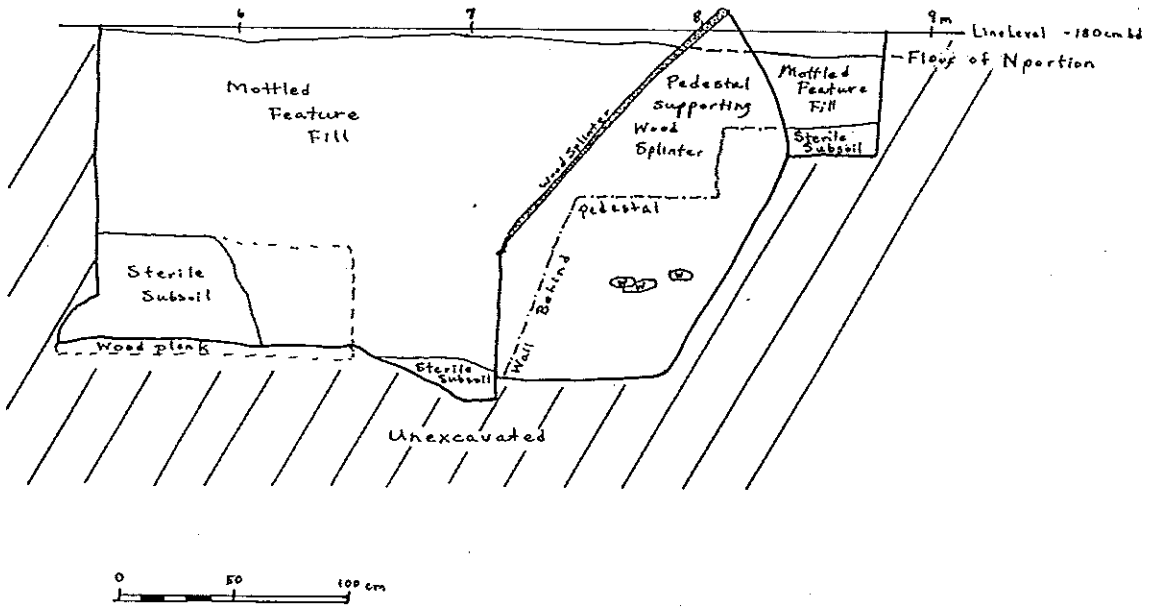


Figure 32. Profile of 167-342 cm segment of cross-section showing F#981 fill and the pedestaled pole splinter ending directly above the shallow depression at the bottom of the feature.

remainder, including a splintered section of the pole, back into the hole when it was refilled.

The final stages of excavation in X-981 involved covering the wood planks in the "South" and "West" trenches and removal of the wood splinter and pedestal. Wood samples were collected from the trench planks, the splintered pole fragment, and some other possibly structural elements in the jumbled wood. The remaining portions of the trench planks were left in the ground and covered with sheets of aluminum foil topped with heavy cardboard. Aluminum beverage cans, a handful of coins with "1998" mint dates, and some fragments of colored flagging tape were placed on top of the covered planks. A small glass jar, containing modern items from the Society and Fort Hays, was placed in the center of the feature and covered with cardboard. Subsequently, the pedestal that had supported the splintered pole fragment was removed. Other than wood fragments, only one piece of cultural material was recovered during removal of the pedestal, an amber bottle finish. Time and weather did not permit careful excavation of the entire area behind and beneath the pedestal. A quick shovel test in this area revealed the presence of more jumbled wood fragments of various sizes. No evidence of wood planks was found in the western end of the "East Trench." It is quite possible that remnants of such planks would be found if this trench, or the "North Trench," were excavated in their entirety. It was decided to cease excavations and preserve the remainder of this feature intact.

Before X-981 was backfilled, a metal expandable curtain rod was used to mark the location of the deep Giddings drill core test. Pin flags and flagging tape were also left on the surface of the feature exposed in the north half of the unit. Although efforts were made during backfilling to keep the curtain rod as vertical as possible so that it would accurately mark the location of the unit, the pressure of the dirt pushed into the unit by the city backhoe caused the rod to lean to the southeast, toward the visitor's center. The unit that had taken 12 days to excavate by hand took less than two hours to backfill by backhoe.

ARTIFACT ANALYSIS

Laboratory Processing and Analysis

All artifacts recovered from the excavations at the original Fort Hays flagpole were returned to the Society's archeology laboratory for processing. Laboratory processing included cleaning, sorting, and rebagging all recovered cultural material. Artifacts were carefully cleaned using techniques (e.g., washing, wet brushing, dry brushing, etc.) appropriate to the different types of artifacts and materials. Damp artifacts, as well as any soil or wood samples, were allowed to air dry as necessary. Careful attention was paid to maintaining proveniences for all artifacts. For cultural materials to be easily entered into the catalog, the next processing step involved sorting the artifacts into preselected database categories. Within categories, like items (e.g., plain clear glass container body sherds, undecorated whiteware body sherds, brick fragments, window glass sherds, cut nails, wire nails, etc.) were bulk bagged. Potentially diagnostic artifacts (e.g., bottle finishes and bases, ceramic rim sherds, sherds with complete or fragmentary maker's marks, buttons, etc.) were individually bagged. Cleaning and sorting of the artifacts from Fort Hays was completed in the Archeology Office laboratory by volunteer Anne Greitl.

Cataloging of the cultural material assemblage recovered from the 1997 investigations was completed by Marsha K. King. For this project the KSHS archeology office used a modified paper version of a computerized laboratory catalog that was developed in-house. Artifacts were sorted into one of 29 database (DB) categories, that correspond roughly to function (Table 2). The paper catalog sheets provided spaces for both provenience information and artifact descriptions. Seven provenience fields provided information concerning the exact provenience from which each artifact was recovered. Data recorded were site number, area, excavation unit, feature number, level number, depth, and provenience

Table 2. Database Categories Used to Catalog Cultural Materials Recovered from the Fort Hays (14EL301) Flagpole Excavation.

DB Category	DB Code	Types of Items Cataloged in DB Category
AMMO	AM	ammunition
BYPRODUCTS	BP	by products (coal, clinkers, slag)
CLOTHING	CL	clothing (clothing, footwear, headwear, accessories, & fasteners)
CONSTMAT	CM	construction materials (brick, mortar, plaster, shingle, tile)
CONTAINR	CT	containers (bottles, jars, & cans)
FIREARMS	FA	firearms, weapons, & accessories (muskets; rifles, shotguns, pistols, Knives, swords, cleaning kits, bayonets, etc.)
FLATWARE	FW	flatware & utensils (table service & food preparation)
HARDFAST	HF	hardware fasteners (nails, screws, bolts, etc.)
HARDMISC	HM	hardware & miscellaneous items (fence, ladder, trap, bucket, scrap metal)
ORGANICS	OR	flora & fauna (wood, plant, fiber, shell, & bone)
PERSONAL	PS	personal items (beads, coins, handbags, billfolds, eye glasses, jewelry, sewing, scissors, smoking, office supplies)
TOOL	TL	tools (hammers, saws, screwdrivers, files, rasps)
TABLWARE	TW	table & utilitarian wares (beverage glasses, serving items, table setting, & utilitarian items)
UNID	UN	unidentified items
WINDOWGL	WG	window glass

code. Artifact-specific information included specimen number, item count, weight, material, function, type, subtype (object), portion, length/height, width/diameter, thickness/depth, color, decoration, and comments. Specimen numbers were only assigned to unique and potentially diagnostic items (e.g., bullets and cartridges, buttons, coins, whole bottles, vessels or sherds containing maker's marks or labeling, etc.). The ITEM COUNT column allowed for items that are exactly the same, either complete artifacts or similar fragments, to be cataloged together with the number of items in a lot recorded. Weights (in grams) were measured for three categories of cultural material (organics, byproducts, and construction materials) and were recorded in the WEIGHT field. The type of artifact was listed from the general to the specific by completing the FUNCTION, TYPE, and SUBTYPE fields. The PORTION column indicated whether each item was complete, only fragmentary, or which particular part of the item was present. The dimensions of the item (in inches) were recorded by LENGTH (or height), WIDTH (or diameter), and THICKNESS (or depth) fields. The COLOR, DECORATION, and COMMENTS fields were included to provide space for additional information about the artifact (e.g., manufacturer, manufacturing technique employed, date or place of manufacture, etc). In some cases a sketch of the item or of a maker's mark or label was made on the catalog sheets in this space. In addition to these items of site and artifact information, spaces were

provided on the cataloging sheets for the cataloger's name, the cataloging date, and the sheet number.

Analysis of the artifact assemblage recovered from the Fort Hays Flagpole excavations was conducted by Marsha K. King. Specific artifacts or artifact categories were examined in more detail as necessary. One such item, a clay pipe bowl which appeared to contain residue, was sent to Mary Adair at the Museum of Anthropology, University of Kansas, for analysis.

Since the focus of this investigation at Fort Hays was on the location and construction of the flagpole, several samples of structural wood elements were sent out for analysis. Appreciation is given to Professor Joseph R. Thomasson at Fort Hays State University, Mary Adair at the University of Kansas, and Larry Rutter of the Society's Historic Sites Division, who examined and analyzed the wood samples. Their research, which is discussed later, greatly aided the analysis of this material.

Analysis of the Recovered Artifact Assemblage

A total of 338 artifacts were recovered during excavation of X-981 near the center of the Fort Hays parade ground (Table 3). This number does not include a large number of wood fragments of varying sizes that were noted during the excavation. Many wood samples were collected, only a small number of which were kept and analyzed. The artifacts recovered from the flagpole feature may have been deposited either when the flagpole was originally constructed or when the flagpole was removed from the center of the parade ground, ca. 1869 to 1873, and the resulting hole was backfilled. It is also possible that artifacts deposited during the original construction episode could have been excavated and redeposited when the flagpole was removed and the hole filled.

Twenty-three (6.8 percent of the total artifact assemblage) items were recovered by the backhoe operator while excavating work areas and access roues. Some of these were diagnostic artifacts of great interest, providing information about the date range and occupation of the site. They were recovered from an obviously disturbed context with no specific provenience (i.e., horizontal and vertical control), and it was not possible to determine whether they had been part of the feature fill or deposited on the old ground surface. Most of these artifacts were fragments of containers (10 pieces, 43.5 percent of this collection), including a clear glass bottle finish and four pieces of a stoneware ale or stout bottle. Two clay smoking pipe stem fragments, a portion of a cannon friction primer, and a flake of Smoky Hill jasper, were also recovered by the machine operator.

Many pieces of cultural material were recovered from the upper 50 cm of X-981. A total of 143 pieces of cultural material (42.3 percent of the total artifact assemblage) were collected from the two uppermost levels (0-13 and 13-50 cm), excavated while defining the top of the feature. The majority of the artifacts from these two levels consisted of hardware fasteners (53 pieces, 37.1 percent) and container fragments (38 items, 26.6 percent). A cuprous rivet with some apparent canvas fabric attached was recovered from the 0-13 cm bd level. This rivet appeared similar to those used on various military haversacks or other bags. A ferrous knife handle recovered from the same level may also have been of military issue for use with a mess kit. A 5.75 in-long triangular bastard file was recovered from the 13-50 cm bd level.

The majority of artifacts recovered from the feature fill were collected between depths of 50 and 150 cm (19.7 and 59.1 in) bd. Nearly one-half of the artifacts recovered during this project (158 items, 46.7 percent of the entire assemblage) were collected from these two levels in the upper portion of F#981. A total of 107 artifacts (31.6 percent of the total assemblage) were recovered from the 50-100 cm (19.7-39.4 in) bd level. The best represented database was organics with 68 items recovered from the 50-100 cm level, three from the 100-150 cm level, and another organic item collected during wall expansion. This

Table 3. Cultural Material Recovered from X-981/F#981, Fort Hays (14EL301) Flagpole Excavation, by Depth.										
DB	Backhoe Areas	0-50 cm	50-100 cm	100-150 cm	50-150 cm Wall Exp.	150-200 cm	200-250 cm	250-300 cm	300-342 cm	Total
AM	0	0	0	0	0	0	1 (20.)%)	0	0	1 (0.3%)
BP	0	2 (1.4%)	0	13 (36.1%)	0	0	0	0	0	15 (4.4%)
CL	0	0	1 (0.9%)	0	0	0	0	0	0	1 (0.3%)
CM	0	1 (0.7%)	2 (1.9%)	0	2 (13.3%)	0	1 (20.0%)	0	0	6 (1.8%)
CT	10 (43.5%)	38 (26.6%)	9 (8.4%)	6 (16.7%)	7 (46.7%)	3 (37.5%)	3 (60.0%)	1 (100%)	0	77 (22.8%)
FA	1 (4.3%)	0	0	0	0	0	0	0	0	1 (0.3%)
FW	0	1 (0.7%)	0	0	0	0	0	0	0	1 (0.3%)
HF	3 (13.0%)	53 (37.1%)	19 (17.8%)	12 (33.3%)	2 (13.3%)	1 (12.5%)	0	0	0	90 (26.6%)
HM	1 (4.3%)	12 (8.4%)	1 (0.9%)	2 (5.6%)	0	0	0	0	0	16 (4.7%)
MM	0	1 (0.7%)	0	0	0	0	0	0	0	1 (0.3%)
OR	0	9 (6.3%)	68 (63.6%)	3 (8.3%)	1 (6.7%)	4 (50.0%)	0	0	0	85 (25.1%)
PH	1 (4.3%)	0	0	0	0	0	0	0	0	1 (0.3%)
PS	2 (8.7%)	0	0	0	2 (13.3%)	0	0	0	0	4 (1.2%)
TL	0	1 (0.7%)	0	0	0	0	0	0	0	1 (0.3%)
TW	5 (21.7%)	11 (7.7%)	0	0	0	0	0	0	0	16 (4.7%)
UN	0	1 (0.7%)	0	0	0	0	0	0	0	1 (0.3%)
WG	0	13 (9.1%)	7 (6.5%)	0	1 (6.7%)	0	0	0	0	21 (6.2%)
Total	23 (6.8%)	143 (42.3%)	107 (31.6%)	36 (10.6%)	15 (4.4%)	8 (2.4%)	5 (1.5%)	1 (0.3%)	0	338

large number is somewhat misleading, in that 63 of the organic items consisted of bones of a small rodent. The other artifacts cataloged in the organics database included eight fragments of large mammal bone and a single shellfish fragment. Thirty-six items (10.6 percent) were collected from the 100-150 cm (39.4-59.1 in) bd level, and only 15 artifacts (4.4 percent) were recovered during expansion of the unit walls between 50 and 100 cm bd. Two interesting artifacts were recovered from these upper two levels, a military button and a clay smoking pipe. The brass General Services uniform button, dating to ca. 1855-1884, was recovered at a depth of 58 cm bd in the southern portion of X-981, near the center of the flagpole feature. The complete ball clay tobacco pipe was found on the west side of X-981 while expanding the unit walls to better define the shape of the feature. Unfortunately, the decoratively molded pipe did not have any lettering to indicate the maker or place of manufacture.

With the exception of pieces of wood of varying size, the quantity of cultural material in the feature fill declined dramatically in the lower levels of the excavation. Eight artifacts (2.4 percent of the total assemblage) were recovered from the 150-200 cm (59.1-78.8 in) bd level in F#981. Half of these artifacts were organic materials, consisting of part of a sawed steak bone, two other fragments of mammal bone, and a single bone from a small rodent. The other four items recovered from this level included a complete machine-cut nail, three glass container body sherds, probably from an amber beer or brandy bottle, an olive wine or liquor bottle, and an unidentified clear bottle or jar. Five items were collected during excavation of the 200-250 cm (78.8-98.5 in) bd level. Three of these artifacts were cataloged in the container database as bottle or jar glass fragments, including a cobalt blue base fragment and two light aqua sherds. One of these artifacts consisted of a badly smashed lead bullet, probably a .50 caliber slug. The final item was a fragment of soft brick. A single artifact, a piece of amber glass, probably from a beer or brandy bottle finish, was recovered from the 250-300 cm (98.5-118.2 in) bd level of the feature fill. No cultural material other than wood was noted or recovered from the bottom level of F#981, 300-342 cm (118.2-134.7 in) bd.

Nearly three-quarters (251 items, 74.3 percent) of the total assemblage recovered during excavation of X-981 consisted of artifacts cataloged within only three database categories, hardware fasteners, organics, and containers. Ninety artifacts (26.6 percent) were cataloged as hardware fasteners (HF), the majority of which (53 items, 58.9 percent of the hardware fasteners) were recovered from the 0-50 cm bd level. Most of these consisted of partial or complete machine cut nails (78 pieces, 86.7 percent). There were also four (4.4 percent) machine cut spikes, three (3.3 percent) pan-head screws, and one each (1.1 percent each) handwrought nail, handwrought spike, horseshoe nail, washer, and wire nail. The single wire nail, the most modern of the hardware fasteners, was collected from the sod and roots in the 0-13 cm bgs layer.

The database category with the second largest number of artifacts (85 pieces, 25.1 percent) was organic materials (OR). The wood samples collected were not included in this category. The majority of the organic items (68 pieces, 80.0 percent) were recovered from the 50-100 cm bd level. Nineteen pieces (22.4 percent of the organic assemblage) of the organic items cataloged consisted of fragments of butchered bone, probably the remains of food consumed at the fort. Two other items cataloged in this category were small pieces of shell, probably from a clam or oyster. The majority of organic artifacts recovered were 64 pieces (75.3 percent) of bone from one or more small rodents.

There were 77 container (CT) related items recovered from the flagpole excavation, representing 22.7 percent of the total artifact assemblage. Nearly half of the artifacts in this database (37 items, 48.0 percent) were recovered from the 0-50 cm bd level. The majority of the container items were sherds of glass (68 pieces, 88.3 percent of the container assemblage), with five (6.5 percent) of stoneware and one (1.3 percent) of metal. Most of the glass container artifacts were body sherds (65, 95.6 percent of the glass sherds), with 15 (23.1 percent) being from bottles and 50 (76.9 percent) from either bottles or jars. A few embossed letters are present on several of the glass body sherds, but none have enough letters to decipher a

manufacturer's name, contents, or place of manufacture. The other three glass container sherds were bottle finishes. An amber glass crown finish, probably from a beer bottle was recovered from the 0-13 cm bgs level. A clear glass finish of the type commonly used on patent medicine bottles was found by the backhoe operator while excavating the 0-150 cm bgs level of the work area on the south side of the unit. The third bottle finish, recovered while removing the 250-300 cm bgs level of the pedestaled slanting post fragment, was a beer or brandy style finish of amber glass probably from a beer bottle. The five stoneware bottle sherds may well have come from a single bottle, as at least three of these sherds fit together. All five stoneware sherds were recovered from the upper levels of the excavation, from depths of 0-150 cm bgs. The bottle was glazed on the exterior, with the lower portion of the bottle a light cream color and the upper part a shade of gold. Turning marks from the bottle's manufacture are visible on the interior surface of the sherds. Unfortunately, no bottle finishes, impressed manufacturer's marks, or paper labels were visible on the recovered stoneware sherds. Stoneware bottles of this type were commonly used during the early to late-nineteenth century to store and ship ale and stout. These two beverages, which have a higher alcohol content than beer, were popular on the western frontier prior to the appearance of lager. The "heady character" of these malt beverages "permitted relatively safe shipment over considerable distances before the time of pasteurization." Labels and marks on stoneware bottles recovered from other sites indicate that the contents were brewed as far away as Edinburgh and Glasgow, Scotland. Similar stoneware ale and stout bottles have been recovered from other military posts, such as Fort Union, New Mexico, and Fort Laramie, Wyoming, dating to the period from ca 1850 to 1890 (Wilson 1981:7-10).

Twenty-one (6.2 percent) fragments of window glass (WG) were recovered. Thirteen of these fragments (61.9 percent of the window glass) were collected from the 0-50 cm bd level. The glass sherds ranged in thickness from 0.052 to 0.136 in. The mean thickness of window glass recovered from the Fort Hays Flagpole excavations was examined using Schoen's (1990:87) predictive model for dating rural middle to lower class nineteenth-century Plains frontier structures based on the mean thickness of window glass. In the last decade, archeologists have worked to correlate the thickness of nineteenth-century window glass fragments with the dates when structures were constructed or occupied. This technique is applicable only on a regional basis. Dates based on mean window glass thickness can be seriously affected by a number of regional and site specific variables such as technology, the length of the site's occupation, access to markets, costs of production and transportation, the use or reuse of old glass, and repeated episodes of window breakage and replacement. The mean thickness of window glass was calculated for the site as a whole and for each of the three excavation provenience where window glass sherds were recovered. These mean thickness figures were then compared with the model. The sample size recovered from the excavations, a total of only 21 sherds, was not large enough for statistically meaningful results, but do provide some information for dating the deposits. The mean thickness of the entire window glass assemblage recovered during the flagpole excavations was 0.08126 in. The mean thickness of the window glass from within the flagpole feature was 0.08256 in. Schoen's model predicts a construction and/or occupation date during the 1860s to 1870s for a site with this range of window glass thicknesses. This date range is appropriate for the Fort Hays flagpole, as the hole was first excavated 1867 when the original pole was erected and then reexcavated between 1869 and 1873 when the flagstaff was relocated.

By looking at the frequency distribution of window glass sherds by thickness ranges it is clear that there are two peaks. The first sudden increase in the number of sherds occurred within the thickness range associated with a predicted date in the 1860s and 1870s (Table 4, Figure 33). This corresponds well with the dates when the original flagpole was erected in 1867 and relocated between 1869 and 1873. The second peak, dating to the period after 1900, is probably associated with the post-military use of the site, including razing and moving of many of the fort structures. As might be expected, all four of window glass sherds with thicknesses suggesting dates after 1880 were recovered from the upper levels of the excavation.

Table 4. Frequency Distribution of Window Glass Sherd Thickness Recovered from the Fort Hays (14EL301) Flagpole Excavations with Date Range Estimate from Schoen's (1990:87) Model.

Thickness Range (in)	No. of Window Glass Sherds	Estimated Date Range
0.0405 - 0.0463	0	1800s
0.0464 - 0.0521	1	1810s
0.0522 - 0.05795	1	1820s
0.058 - 0.0639	1	1830s
0.064 - 0.0697	3	1840s
0.0698 - 0.0755	2	1850s
0.0756 - 0.0813	4	1860s
0.0814 - 0.0871	5	1870s
0.0872 - 0.0930	0	1880s
0.0931 - 0.09885	0	1890s
0.0986 - 0.140	4	post-1900

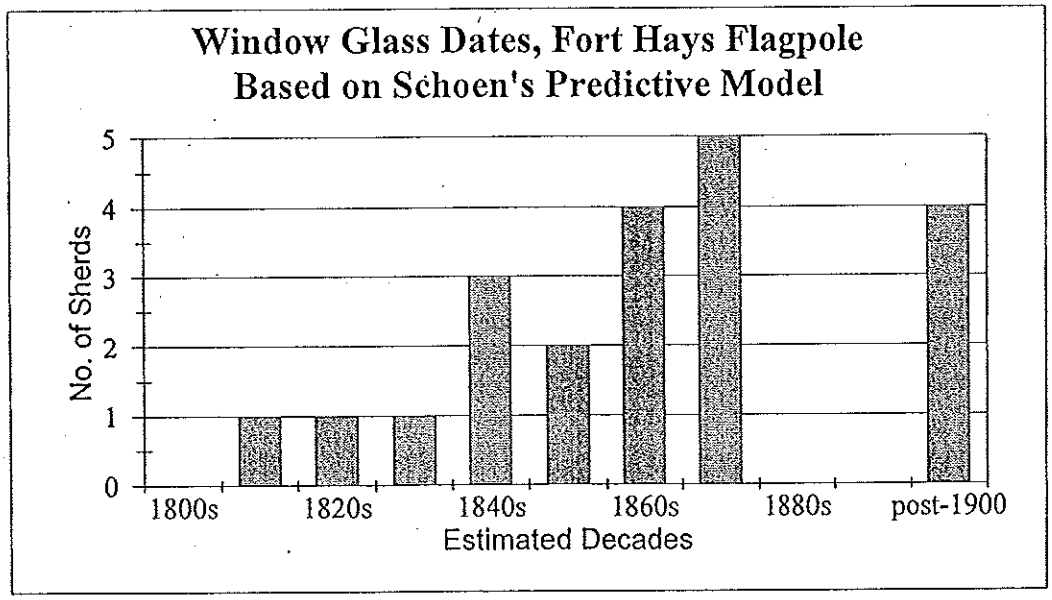
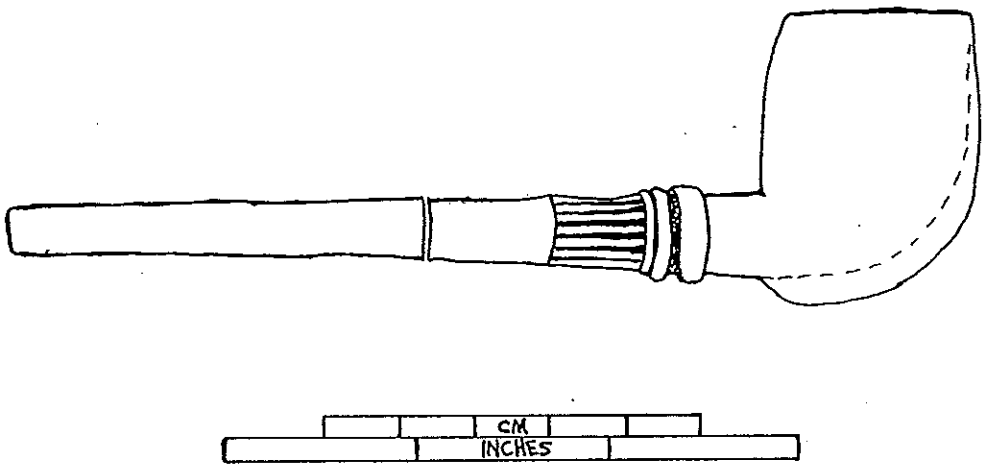


Figure 33. Graph showing frequency distribution of window glass mean sherd thickness with date range estimates based on Schoen's (1990:87) predictive model, Fort Hays (14EL301) flagpole excavations.

Most of the remainder of the artifact assemblage were cataloged in three database categories, hardware miscellaneous, table and utilitarian wares, and by-products. Sixteen items (4.7 percent) were cataloged as hardware miscellaneous (HM). The majority of the hardware miscellaneous items (12 pieces, 75.0 percent of this assemblage) were recovered from the 0-50 cm bd level. This category included three pieces of fine cuprous wire, possibly from a delicate spring, five fragments of ferrous wire, and eight small pieces of scrap iron. The table and utilitarian ware (TW) category was also represented by 16 (4.7 percent) artifacts. Eleven of these items (68.8 percent of this assemblage) were collected from the 0-50 cm bd level. None of the ceramic and glass table and utilitarian wares were recovered from below 50 cm bgs. Five materials or ware types were represented, including seven sherds (43.8 percent of the tablewares) of porcelain, four (25.0 percent) of glass, three (18.8 percent) of whiteware, and one each (6.25 percent each) of Rockingham and stoneware. Nine sherds were identified as sherds from table setting vessels, four from table serving vessels, two could have functioned as either table setting or serving vessels, and one from a utilitarian vessel. Six of the porcelain table setting pieces were parts of two very small cups, possibly either from demitasse sets or from children's toy tea sets. At least two of the four glass sherds were from a heavy stemmed glass vessel, probably a serving or candy dish, but possibly a large snifter. The single Rockingham sherd was a rim fragment from a probable pitcher or tea pot. The last of these three databases contained 15 (4.4 percent) pieces cataloged as by-products (BP). These included nine pieces of coal and two of cinder. The majority of the by-product fragments were recovered from the 100-150 cm bd level of the excavation.

Small quantities of artifacts were cataloged within ten other database categories. Among the more numerous of these were construction materials and personal items. Six (1.8 percent) fragments of construction material (CM) were recovered, including six pieces of brick and one of mortar. The wood samples collected from the excavation were not included in this category. All four (1.2 percent) personal (PS) items were portions of clay tobacco pipes, including two stem fragments and a complete pipe broken into two pieces. The two small stem fragments were found by the backhoe operator during backhoe excavation of the work area, one in the 0-50 cm bgs level on the north and one from the 50-120 cm bgs level on the south side of the excavation unit. Amazingly, these two stem fragments fit together. Raised lettering was present at a 90° angle to the long axis of the pipe stem on the matching edges of the two stem fragments. The lettering formed part of a probable maker's mark. Although difficult to decipher, it appeared to read "L. Fiore_ / _ S^{t} Om_ / Depo_." This mark probably refers to a pipe maker or factory in St. Omer, a small town in the Department of Pais-de-Calais in northern France. The Fiolet family manufactured white ball clay pipes from 1764 until the company discontinued pipes in 1920. In 1834 Louis Fiolet took over his father's factory and operated it until his death in 1892. The last line of this mark, "Depo_," may refer to a French phrase indicating a copyright or trademark. Clay pipe stems recovered from other archeological sites with the wording "DUMERIL / S'OMER" suggest that another firm may have also manufactured pipes in this small French town (Fresco-Corbu 1962:1445; Minor, Toepel and Beckham 1989:168; Pfeiffer 1982:98, 1983a:176,1983b:190; Wilson 1971:17). Both pieces of the complete ball clay pipe were recovered from a depth of 50-150 cm (19.7-59.1 in) bd during expansion of the unit walls. The fresh appearance of the break indicated that it was probably deposited complete and only broken during our excavation. With the exception of a raised spine extending along the outside of the bowl front to the heel, the pipe bowl was plain and unmarked. The stem of this pipe was decoratively molded near the bowl with three raised rings of decreasing in size and a number of raised lines running about 0.5 in up the stem to another, and smaller, ring (Figure 34). No pipe of similar design was found in the archeological literature. A quantity of dark residue was noted on the interior of the bowl. Mary Adair analyzed this residue, or dottle, and indicated that it was clearly a badly-charred fibrous mass (Appendix B). The residue appeared to be the charred remains of the last smoking episode.

Eight database categories contained only a single artifact (0.3 percent). The ammunition (AM) category contained a single smashed lead bullet, probably .50 caliber, recovered from the 200-250 cm bd



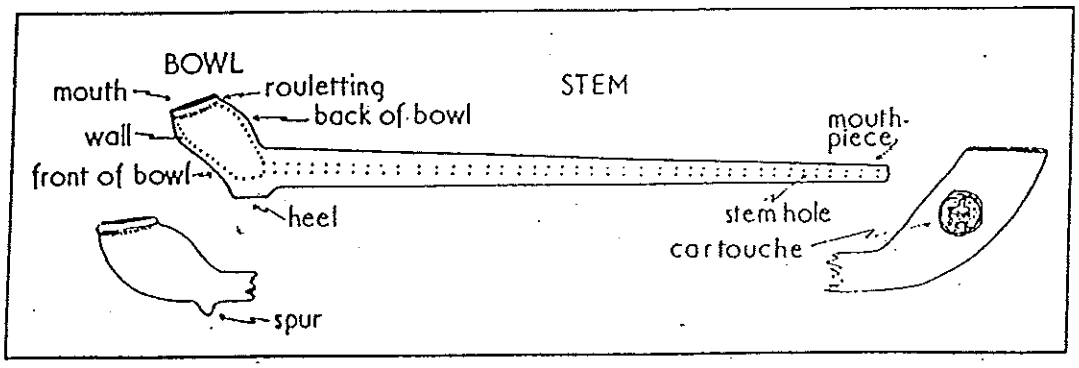


Figure 34. Sketch of the complete ball clay smoking pipe recovered from a depth of 50-150 cm (19.7-59.1 in) bd during wall expansion in X-981, with insert diagram showing parts of a typical clay tobacco pipe.

level of the excavation. The bullet was recovered immediately adjacent to the upper portion of the leaning piece of rotted flagpole, suggesting that it may once have been fired into and imbedded in the wooden pole. The only clothing (CL) item recovered was a single brass military button found a depth of only 58 cm bgs near the center of the flagpole feature. Stamped on the convex front of the button was an eagle with long narrow wings and a flat, recessed, lined shield on its breast. This type of military button, referred to as a General Services button, was authorized for all enlisted men and was used between 1855 and 1884. No manufacturer's name was visible on the reverse, although the most common maker's names on this type of button are Horstmann or Scovills (Brinckerhoff 1972:5). The size of the button, 0.745 in, indicates that it was used on the front of a military uniform blouse or jacket, rather than on a sleeve cuff (U.S. Quartermaster General 1986:84-85). The single item cataloged within the firearms and edged weapon (FA) database, recovered from the backhoe excavation at a depth of between approximately 50-120 cm (19.7-47.3 in) bd, was part of an unfired friction primer of the type used on mid-nineteenth century cannons.

> The friction primer was the principal means of igniting the powder charge in the cannons of both North and South. Basically, it consisted of two copper tubes . . . soldered together at right angles. The short tube was filled with a friction composition into which was inserted a wire serrated on the end. The other end of the wire was twisted to form a loop. Musket powder filled the long tube, which was closed with a plug of wax. The primer was then varnished to make it somewhat waterproof.
>
> To fire the cannon, the long shaft of the friction primer was placed into the vent and the wire loop bend so that it was horizontal. The hook of the lanyard was attached to the loop and at the appropriate time was given a pull. The serrated wire drawing through the friction composition ignited it and in turn the musket powder, the flame communicating quickly with the powder charge in the bore (Thomas 1995:25).

The serrated wire in the end of the recovered friction primer fragment was intact. The only flatware (FW) artifact recovered was a portion of a rusty metal handle with a raised scroll or vine design. This appears similar in size and shape to handles from military "mess kit" knives, although without the "U.S." or "U.S.A." stamped on the military issue handles. Prior to 1875 the military did not issue utensils to individual soldiers, rather these items were purchased from the "Company fund." Commercial versions of this knife were available and have been recovered from other frontier military posts (McChristian 1995:187, 293 n.47). The metal handle recovered from F#981 may be from a commercial utensil used by the soldiers before issue of the 1875 government knife, thus fitting with the estimated dating of the flagpole construction and removal (ca. 1867-1873). The item cataloged as military miscellaneous (MM) was a brass rivet with a fragment of cloth, possibly canvass attached. This rivet, which had a diameter of 0.55 in, appeared similar to those used on various military packs and bags. One of these was the M1855 knapsack of the type used during the Civil War, "made of black painted canvas in the form of two bags approximately twelve inches square" (McChristian 1995:35, 187), another was the M1855 haversack, "a bag 12.5 inch by 13 inch by 3.5 inch of black enameled cotton cloth with a leather closure strap and a removable, unpainted cotton bag liner buttoned inside" (Allie 1991:12). These bags remained in use by the military until they were replaced by new models issued in 1874. One flake of Smoky Hill jasper, cataloged in the prehistoric (PH) database category, was recovered from the 0-50 cm bgs level during backhoe excavation of the work area on the north side of the excavation unit. The single tool (TL) item recovered from the excavation was a 5.75 in long triangular file. This tool was too small and delicate to have been used to sharpen shovels or other excavation equipment which might have been by the soldiers digging the hole for the flagpole base. One rusty iron fragment could not be identified and was cataloged in the unidentified (UN) category.

Analysis of the Wood Samples

Wood was scarce in western Kansas in the 1860s and trees capable of providing a reasonably straight trunk sections measuring at least 40-50 ft in length were virtually non-existent. Prior to excavation of F#981, it was assumed that the two poles used to construct the Fort Hays Flagpole, which had a total overall length of approximately 90-86 ft (80-85 ft above ground and 11 feet below ground), must have been imported. It was considered most likely that these poles were imported from the Great Lakes area to Fort Leavenworth and then by train and wagon to Fort Hays. Alternately, it was regarded as possible that these long poles could have been cut in the Rocky Mountains and hauled overland to the fort. It was expected that the wood comprising the planks, bracing, and box framing might have been harvested locally to avoid the necessity of hauling these additional pieces. The results of the wood analysis should confirm or deny these assumptions.

A large quantity of wood was encountered during the excavation of X-981 and F#981. Much of the wood recovered from the upper levels, above 250-300 cm (98.5-118.2 in) bd, consisted of mere scraps or fragments, although a few larger pieces apparently from 2 x 2-in or 2 x 8-in boards were noted and/or collected. Significant quantities of structural wood was encountered in the lowest levels of the feature fill. Some of this wood remained apparently undisturbed and *in situ*, while other pieces had clearly been disturbed, broken, twisted, removed, or rearranged.

Four samples were taken from larger pieces of wood and sent out for analysis. The samples were selected, based on their size, shape, and provenience, to represent different structural elements of the flagpole. These samples included: 1) a piece of the long angled splinter believed to be a fragment of the flagpole; 2) a segment of one of the thick planks from the "West Trench" which helped anchor the flagstaff; 3) a piece of one of the 2 x 2-in elements possibly used as an angled brace; and 4) a portion of one of the 2 x 8-in planks which may have been used as part of a box frame to connect the pole to the anchoring planks.

Three individuals agreed to examine and analyze the recovered wood samples. Larry Rutter, of the Society's Historic Sites Division, indicated after a cursory examination that the samples appeared to be from a hardwood and were probably from a deciduous, rather than a coniferous, tree. Dr. Mary Adair's analysis included microscopic examination of the wood. She concluded that the samples were hardwood from a deciduous tree. Microscopically the wood was porous, with many small openings. Since this was beyond her specialty, Dr. Adair did not attempt to determine the exact species. The most complete analysis of the wood samples recovered from F#981 was provided by Dr. Joe Thomasson, Professor of Botany in the Department of Biological Sciences at Fort Hays State University (Appendix C). Dr. Thomasson's analysis included scanning electron microscopy (SEM) resulting in clear pictures of the internal structure of the wood. He found good cellular detail even though the wood was decayed and covered with fungus. The SEM micrographs, cross-sections and longitudinal sections of the various wood samples, clearly showed the internal structure of the wood. When compared to standard reference wood samples, all the wood samples from F#981 appeared to be from a species of oak (*Quercus*), probably the white oak (*Quercus alba*).

White oak is "the classic eastern oak, with widespreading branches and a rounded crown, the trunk irregularly divided into spreading, often horizontal, stout branches." These trees typically grow to a height of 80-100 ft or more with a trunk diameter of 3-4 ft (Little 1980:382). This species of oak is not native to the immediate vicinity of Fort Hays, grows in moist well-drained uplands and lowlands. White oak is native to extreme eastern Kansas and most of the eastern United States from "S. Ontario and extreme S. Quebec east to Maine, south to N. Florida, west to E. Texas, and north to E. central Minnesota; to 5500' (1676 m), or above in southern Appalachians" (Little 1980:383).

White oak is a "high-grade" wood that has many uses. It is sometimes referred to as "stave oak" because the wood is well suited to make staves for tight barrels to hold whiskey or other liquids. White oak was often used during Colonial times in shipbuilding (Little 1980:383).

The availability, hardness, and tendency of white oak to grow with long straight trunks (or boles), apparently made it an obvious choice for a flagstaff. While the white oak used at Fort Hays would not have been locally attainable in western Kansas, it might have been available in eastern Kansas, perhaps in the vicinity of Fort Leavenworth. It is also possible that the long straight sections needed for the flagpole and the heavy timbers for the base support may have been acquired in the eastern United States and shipped to the military post in western Kansas. By the mid-1860s eastern Kansas was easily accessible to both river and railroad traffic capable of transporting the heavy and bulky wood elements from eastern forests.

CONCLUSIONS

The archeological investigations undertaken on the parade ground at Fort Hays (14EL301) succeeded in identifying the location of the fort's original flagpole. While no intact vertical section of the 1867 flagpole was found during excavation of F#981, significant buried structural remains of the flagstaff's subterranean support system were documented. Evidence of the original method of construction and the later removal of this flagpole was also encountered in the feature.

Structural remains of the flagpole's subterranean support system encountered in F#981 included intact planking, a probable splintered section of the flagpole, and other wood elements probably used in the construction. All of the wood used in the flagpole construction was white oak. Since it was not native to the vicinity, the wood must have been transported to the post from the east, where it is common. Most likely the wood was shipped through the supply depot at Fort Leavenworth. The wood was probably milled to relatively standard sizes before it arrived at Fort Hays, quite possibly before it was acquired by the U.S. Army.

Remnants of intact wood planks were present along the entire length of the "West Trench" and plank remnants were visible in the far end of the "South Trench." The location of these heavy planks, resting directly on sterile subsoil at the bottom of the hand-excavated trenches, clearly indicated their function as anchors for the flagpole. The extent of the disturbance to the heavy wood planks in "South Trench" suggested that a strong twisting or pulling force may have been applied to the flagpole and transmitted through the pole to the anchoring planks. The portion of the subterranean support system in the "South Trench" was affected, but this disturbance was not evidenced in the "West Trench" which contained rotted but intact planks. This disturbance and the differences noted between the two trenches were probably due to how the flagpole was removed. This pattern suggests that the planks in the "South Trench" may have been at least partially excavated or exposed when the pole was pulled

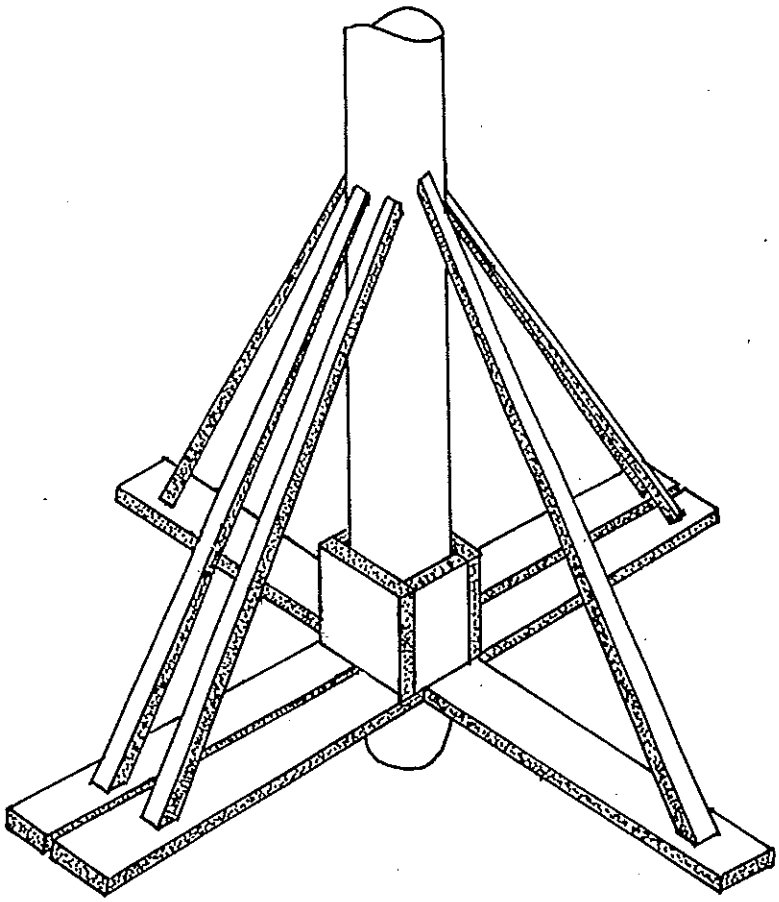
The badly-rotted, long, wood splinter fragment lying at a steep angle within fill soil, from directly above the center of the feature toward the easterly edge of the feature, was interpreted as being a splintered segment of the 1867 flagstaff. It was considered possible that this splinter represented the bottom portion, approximately 195 cm (6 ft-5 in), of the flagpole that either broke during removal or was discarded due to its deteriorated condition. The angle at which the pole splinter was lying suggested that it might have been broken off as the pole was pulled in an effort to remove it from the ground. It is also possible that the angle at which it is resting merely results from the discarded pole segment being placed back in the hole during backfilling.

Among the many fragments of wood recovered during excavation of F#981 were a number in relatively standard sizes and shapes. These included pieces of 2 x 2-in and 2 x 8-in boards of varying lengths and 2.5-in thick planks of varying widths. The size and shape of these wood pieces was suggestive of different structural elements of subterranean support system. The 2 x 2-in pieces were possibly used as angled braces, while the 2 x 8-in planks may have been used as part of a box frame to connect the pole to the anchoring planks. No evidence was recovered of any large nails, heavy iron spikes, or wooden pegs. Such hardware fasteners were expected to have been used to join the angled braces to the flagpole or to connect the box frame. These items may have been salvaged during the removal of the flagpole.

The flagpole erected in the center of the Fort Hays parade ground in the summer of 1867 was built with a strong subterranean support system buried at a maximum depth of 11.3 ft (342 cm) bd. Thick wood planks laid at a depth of approximately nearly 10 ft (300 cm) bd in four trenches provided the necessary strong structural support for the tall flagpole. Professor Beougher's (1996) estimated flagpole height of 80 ft was based on the later flagpole at the north end of the parade ground shown in Colonel Van Vliet's 1873 photograph. If it is assumed that the reason the below ground portions of the original flagpole was removed was to salvage the pole for reuse, then the 4.5-ft splinter of this pole left in the fill suggests that the original pole may well have stood that much taller than the relocated flagstaff in 1873 (i.e., approximately 84.5 ft). A hollowed out depression in the subsoil at the center of the four plank-lined trenches had an estimated 13.8 - 19.7-in diameter. This depression, with a maximum depth of 11 ft 3 in bd, appeared to be the base of the flag pole, providing an indication of the diameter of the pole base. The pole extended between the bracing wood planks and rested on the subsoil below. While no intact evidence of bracing between the planks and pole were noted during excavation, it is assumed, based on the other pieces of wood recovered and the examples from other military posts, that some sort of bracing was probably used to make the support system more solid.

A sketch of the possible construction of the subterranean support systems for the original flagpole at Fort Hays was drafted (Figure 35). This reconstruction was based on various lines of evidence: 1) the intact structural elements documented in F#981; 2) the sizes and shapes of the jumbled fragments encountered in the feature fill; and 3) on similar features uncovered and documented in excavations at Fort Larned, Kansas (Hunt 1983), Fort Smith, Arkansas (Coleman 1985), and Fort McHenry, Maryland (Stephen J. Allie, personal communication 1998). As only two of the four trenches were excavated at Fort Hays, the unexcavated trenches are shown as being identical to the excavated trench on the opposite side of the pole. The angled bracing and frame box in the reconstruction are a best guess, based primarily on the sizes of cut lumber recovered (e.g., 2 x 2-in and 2 x 8-in pieces). No intact portions of these elements were encountered *in situ* and no evidence clearly suggested how the bracing might have been accomplished. No information was recovered archeologically to indicate how elements of the flagpole support system were connected (e.g., nails, spikes, nail holes, wood pegs, peg holes, or notches), so no effort was made to reconstruct this. Based on the depression in the subsoil documented at the center of the feature, the pole is shown extending below the heavy anchoring planks.

The Fort Hays flagpole support system reconstruction differs from the systems documented at Fort Smith and Fort Larned in several ways. The pole used at Fort Hays appears, based on archeological and photographic evidence, to have had a round cross-section like the flagpole at Fort Smith, rather than a square cross-section like the post documented at Fort Larned. Rather than notched beams extending on either side of the post as was documented at Fort Smith, the system used at Fort Hays used heavy planks that appeared to abut the pole with no evidence of being attached to the planks in either the adjacent or opposing trenches. No evidence of notches or sockets were noted along the length of the planks in the "West Trench" similar to those used at Fort Smith to join angled braces to the beams. Unlike at Fort Smith, where the flagpole base was notched to be socketed between the four timbers with the bottom resting on a plank, the Fort Hays flagpole extended approximately 1.3 ft (42 cm) beneath the tops of the anchoring



Not to Scale

Figure 35. Sketch showing possible reconstruction of the semi-subterranean support system of the flagstaff base encountered in F#981, Fort Hays, Kansas (14EL301).

planks and rested directly on the subsoil. While wood planks were used at both Fort Hays and Fort Larned to anchor the support system, the pole at Fort Hays extended through these planks rather than resting on them. No evidence was encountered at the far end of the "South Trench" to indicate the use of vertical elements to attach angled bracing to the planks, as shown in the Fort Larned reconstruction. While the basic pattern of the flagpole support systems documented at these three military posts were similar, using anchoring and bracing elements in four trenches, each system was different from the others in some ways.

Excavation of F#981 provided some evidence of the excavation techniques employed in the original construction of the 1867 flagpole and the later removal of this flagstaff. This evidence consisted of differences in soil colors and textures noted during excavation and documented in soil profiles and plans. Soil profiles in the walls of X-981 strongly suggested that the upper 80-100 cm (31.5-39.4 in) of the original flagpole excavation was removed as a basin, quite possibly excavated by a horse or mule-drawn slip rather than through hand excavation. The total extent of this basin was not determined, but it extended beyond the end of the "South" and "West" trenches. This technique could not easily have been used for the later excavation associated with removing the flagpole from the center of the parade ground, as the pole would have been in the way. Plans of X-981 showing feature fill and sterile subsoil clearly indicated that below a depth of approximately 90 cm (3 ft) the nineteenth century excavations were limited to a roughly circular central hole with four trenches radiating from the center at right angles. This deeper portion of the feature must have been excavated by hand. The hand excavation may have been done by soldiers or possibly by civilian employees of the Quartermaster. No evidence was encountered to clearly indicate how the post was lowered into the hole and set upright. Such evidence may have been disturbed by the later reexcavation when the post was removed.

At least two episodes of excavation and filling must have occurred in this location in order to first erect the original flagpole in 1867 and later to remove it, leaving the disturbance to the subterranean support system. No obvious differences were visible in the feature fill, such as changes in color, texture, or compaction, to distinguish between the two late-nineteenth century excavation episodes. Several lines of evidence suggested that the later excavation undertaken to remove the flagpole was probably on the southeasterly side of the flagstaff. This evidence includes: the relatively intact nature of the planks in the bottom of the "West Trench," twisted plank remnants in the "South Trench," no evidence of planks in the westerly end of the "East Trench," and the angle at which the probable flagpole splinter was lying with its upper portion to the east.

By 1873, when Colonel Van Vliet photographed the Fort Hays parade ground, the flagpole had been moved from the center to the north end of the parade ground. When the 1867 flagpole was moved, it appears that the soldiers excavated along the southeasterly side of the pole. Almost all of the original pole was removed, although a nearly 4.5-ft long wood splinter that was pedestaled along the cross-section face during excavation was interpreted as being a deteriorated or damaged piece of the original flagpole that was left behind in the hole when the flagpole was moved ca. 1873. During the removal some of the heavy wood planks anchoring the base, angled bracing, and box frame connecting the planks to the pole, were damaged and/or removed. Any nails, spikes, or pegs used to connect the various elements together appear to have been salvaged by the soldiers. The excavation was then backfilled. Many damaged or deteriorated pieces and fragments of wood returned to the hole. The presence of so much wood in the feature fill suggests that the pole was removed and the hole backfilled at a time when fuel was plentiful, possibly in the summer. Otherwise it would be expected that these white oak fragments would have been burned in stoves to heat buildings or cook food.

RECOMMENDATIONS

It is recommended that if and when a replica flagpole is erected on the parade ground at Fort Hays State Historic Site that it be located a short distance from the excavated feature (F#981). Significant portions of the underground support system for the flagpole were left intact below 250 cm (98.5 in or 8 ft-2.5 in) bd. These remains, which include the wood planks left *in situ* in the "West" and "South" trenches and the lower portion of the northerly half of F#981, would be available for future investigation and further analysis. The remaining portion of the feature is expected to include two backfilled trenches ("North" and "East" trenches), possibly containing remnants of heavy wood planks similar to those in the south half of this feature.

Suggested possible locations for a flagpole reconstruction include: a few meters south of the wood planks located at the south end of the "South Trench;" a few meters west of the far end of the wood planks located at the west end of the "West Trench;" or at least five meters (16.25 ft) north of the north edge of the work area excavated on the northerly side of X-981.

Due to the nature of archeological manifestations, it is always possible that additional buried cultural deposits could be encountered during the course of the project. If buried deposits are exposed, the remains should be left in place and the State Archeologist contacted immediately so that the appropriate mitigative measures can be carried out as soon as possible. These recommendations have been sent to the State Historic Preservation Officer for his review

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APPENDICES

APPENDIX A: Professor Elton Beougher's Calculations of the Height of the Fort Hays Flagstaff Based on the 1873 (Van Vliet) Photograph

APPENDIX B: Dr. Mary Adair's Analysis of Residue Remaining in a Clay Tobacco Pipe Bowl Recovered from 1998 Excavations of the 1867 Flagpole Base (F#981) on the Fort Hays (14EL301) Parade Ground

APPENDIX C: Dr. Joseph Thomasson's Analysis of Wood Samples Recovered from 1998 Excavations of the 1867 Flagpole Base (F#981) on the Fort Hays (14EL301) Parade Ground

APPENDIX A: Professor Elton Beougher's Calculations of the Height of the Fort Hays Flagstaff Based on the 1873 (Van Vliet) Photograph

The following calculations were used to determine the height of the flag pole at historic Fort Hays, using the 1873 (Van Vliet) photograph of the parade ground and surrounding barracks buildings (Figure 17).

The eaves of the barracks buildings and the height of a person standing on the front porch of the east barracks were used as reference points. The assumption was made that the person was about 5ft-6in (66 in) tall.

Height of Eaves of Porch on East Barracks

The height of the image on the photograph of the person on the porch is 11/32 in. The height of the eaves of the porch on the photograph is 14/32 in. Assuming that the height of the person is 66 in, the following calculation yields the height of the eaves of the porch (x):

$$\frac{11/32}{66 \text{ in}} = \frac{14/32}{x} \qquad x = 84 \text{ in (7 ft)}$$

Thus, the height of the edge of the eaves is calculated to be 84 in or 7 ft.

Height of the Flag pole

The height of the image on the photograph of the eaves of the northwest barracks is 5/32 in. The height of the photographic image of the flag is 8/32 in. Thus, assuming that the height of the eaves of the porch is 84 in (as calculated above), the following calculations yield the total height of the flag pole and the two sections of the flagpole.

Width of the Flag

Assuming that the height of the porch eaves is 84 in, the following calculation yields the width of the flag (x):

$$\frac{5/32}{84 \text{ in}} = \frac{8/32}{x} \qquad x = 154 \text{ in (12 ft-10 in)}$$

Thus, the width of the flag is calculated to be 154 in or 12 ft-10 in.

(Note: This is larger than the flag would be as the image of the flag in the photograph is closer to the photographer than are the eaves of the porch. Thus, perspective would make the flag image appear larger than the height of the porch eaves, which is farther away from the photographer.)

Bob Wilhelm provided the information that there were two sizes of flags flown at the fort during 1873, 36 x 20 ft and 20 x 10 ft. The above calculations and note would suggest that the flag in the 1873 (Van Vliet) photograph is the smaller 20 x 10 ft size.

Height of the Flagpole - Bottom Section

The image on the photograph of the bottom section of the flagpole (from ground surface to end) measures 35/32 in. Using this, the height of the image of the flag (8/32 in), and the assumption that this was a 20 x 10 ft flag, the following calculation yields the length of the bottom section of the flagpole (x).

$$\frac{35/32}{x} = \frac{8/32}{10 \text{ ft}} \qquad x = 43\ 3/4 \text{ ft}$$

Thus, the length of the above ground portion of the bottom section of the flagpole is 43 3/4 ft.

Height of the Flagpole - Top Section

The photographic image of the top section of the flagpole measures 36/32 in. Using this, the height of the image of the flag (8/32 in), and the assumption that this was a 20 x 10 ft flag, the following calculation yields the length of the top section of the flagpole (x).

$$\frac{36/32}{x} = \frac{8/32}{10 \text{ ft}} \qquad x = 45 \text{ ft}$$

Thus, the length of the top section of the flagpole is 45 ft.

Height of the Flagpole - Total Above-Ground Height

The photographic image of the total height of the above-ground portion of the flagpole measures 65/32 in. Using this, the height of the image of the flag (8/32 in), and the assumption that this was a 20 x 10 ft flag, the following calculation yields the length of the top section of the flagpole (x).

$$\frac{65/32}{x} = \frac{8/32}{10 \text{ ft}} \qquad x = 80 \text{ ft}$$

Thus, the total height of the above-ground portion of the flagpole is 80 ft.

The assumption that the person on the porch was 5 ft-6 in tall affects the results of these calculations. Say, for example, that the person was 6 ft tall. This would increase the estimates by a factor of 1/11. Thus, the estimated height of the flag would be about 14 ft. This is still closer to the 10 ft width than to the 20 ft flag width. I believe that the evidence is convincing that the flag shown in the photograph is the 20 x 10 ft one. This leads to the conclusion that the flagpole measurements are those given above, i.e., 80 ft total above-ground height, with 43 3/4 ft for the bottom section, and 45 ft for the top section. This would give an "overlap" of the two sections of 8 3/4 ft.

Prepared by Professor Elton Beougher
Department of Mathematics
Fort Hays State University
Hays, Kansas
November 17, 1999

[modified slightly from the original for clarity and formatting by Marsha K. King]

APPENDIX B: Dr. Mary Adair's Analysis of Residue Remaining in a Clay Tobacco Pipe Bowl Recovered from 1998 Excavations of the 1867 Flagpole Base (F#981) on the Fort Hays (14EL301) Parade Ground

Dottle residue was extracted from a pipe recovered from the Fort Hays parade ground, dating to ca. 1867-1873. While it is likely that tobacco was smoked by both soldiers and civilians at the fort, several varieties of tobacco were available in the mid to late 19th century. Additionally, given the potency of some varieties, other substances were often added to the tobacco before it was smoked. "Cutting" tobacco with select native plants was a common practice among Plains Indian tribes. The Fort Hays dottle residue was therefore examined to determine: 1) its identification as tobacco or some other plant selected for smoking; 2) the variety of tobacco; 3) the presence of any other substance with the tobacco; and 4) the implications of trade relations or association with Indian groups provided by the identification of a specific variety of tobacco.

The dottle residue was gently removed from the pipe bowl and was examined under 10x-40x magnification for any characteristics that could help with identification. Pieces of the residue fragments remained intact and measured 3-4mm in thickness, exhibiting good evidence of structural characteristics and suggesting that the pipe bowl was packed with smoking material on several occasions. Unfortunately, no diagnostic morphological characteristics that could be used for identification were observed. While tobacco seeds are very distinctive (although not to species level), it is unlikely that any seeds would have been present with the dried leaves available for smoking. As a member of the Solanaceae family, tobacco leaves typically display diagnostic stomata which can be used for identification. None were observed on the Fort Hays sample however. A search for preserved phytoliths would not have produced results, as tobacco does not produce a distinctive phytolith (Bozarth, personal communication). More extensive examination, using scanning electron microscopy, would perhaps provide the detail needed for the identification of the Fort Hays sample.

Assuming that the residue is actually tobacco (which may be a logical assumption), several varieties were potentially available to the residents of Fort Hays. Tobacco has been identified in archaeological contexts throughout the Great Plains and research has suggested that two species, *Nicotiana rustica* and *Nicotiana quadrivalvis*, were cultivated by tribes in the Missouri River valley region (Adair 1991, Haberman 1984), and potentially used in different cultural contexts. Seeds resembling
Nicotiana rustica have been identified from the proto-Wichita Mems site (14MN328) (Adair 1991). The "native" tobacco grown today by the Wichita and used for ceremonial purposes could not be *N. rustica* however, since it produces white flowers (Virgil Swift, personal communication). A third variety, *Nicotiana tabacum*, was introduced into North American from the Carribean around the time of contact and quickly spread as the preferred cultivated variety. It was introduced into Europe in 1556 where its use
also quickly spread. By the 17th century, tobacco use had reached Japan, China, and the west coast of Africa. In colonial America, tobacco farming began in 1615 in Jamestown and quickly became the staple crop of the colony. After 1776 tobacco cultivation expanded west as far as Missouri. In about 1865, an Ohio farmer noticed a chlorophyll-deficient strain called white burley, which became the main ingredient of American blended tobaccos, especially after the invention of the cigarette making machine in 1881.

It is unlikely that the tobacco used by the residents of Fort Hays was either of the "native" tobaccos, but was more likely *Nicotiana tabacum*. Further research on military supplies and the origins of supplies to midwest forts could potentially provide additional information on the variety of tobacco used. However, the current proposition that *Nicotiana tabacum* was the variety used is based on the following two points: 1) few native tribes remained in their homeland area in Kansas in the mid to late

1800s, most having been removed to reservations further south and their land open for white settlement. Native farming was severely suppressed as white farmers selected crop varieties better adapted to eastern climates;
2) it was common practice for tobacco to be readily supplied to the military, since it was viewed as important for relaxation and social interaction. A more commercially grown variety would have been more
abundant, and probably viewed as superior over the native varieties. The practice of supplying troops with cigarettes continued through WWII.

Dr. Mary Adair (E-mail dated April 2, 1999)
Museum of Anthropology
University of Kansas
Lawrence, Kansas

[excerpted from e-mail by Marsha K. King]

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APPENDIX C: Dr. Joseph Thomasson's Analysis of Wood Samples Recovered from 1998 Excavations of the 1867 Flagpole Base (F#981) on the Fort Hays (14EL301) Parade Ground

I examined samples of the wood with both scanning electron and light microscopy. I also compared the samples with a reference set of wood blocks prepared by a timber laboratory in Washington, D.C. The results of my study clearly indicate that all samples of wood are from a species of oak (**Quercus**), probably the white oak, **Q. alba**. All of the wood samples exhibited a uniformity of features as seen in micrographs of cross (c) or longitudinal (l) sections (Figures 36 and 37), including:

1) (c) wood distinctly ring porus - **Quercus**
2) (c,l) springwood vessels (pores) with abundant film-like deposits (tyloses) - **Q. alba**
3) (c) both uniseriate and large, aggregate, multiserate (more than 20 cells wide) rays present - **Quercus**
4) (c) presence of elongate bands of small summerwood vessels parallel to rays - **Q. alba**

Quercus alba is found in eastern Kansas and throughout the eastern U.S. According to Stephens (1973:530) "In a wooded area the trunk is fairly long and straight without branches and is considered to be a good timber tree." Further, according to Harlow, Harrar, and White (1979:510) it is ". . . said to furnish nearly three-fourths of the timber harvested. . . ." Considering its hardness, availability, and characteristic of forming long straight boles (trunks), it would not seem unusual for it to have been selected as flag pole material. The wood at Fort Hays might have been obtained in eastern Kansas, but it could also have come from anywhere in the eastern U.S.

Dr. Joseph R. Thomasson (letter dated 12 February, 1999)
Department of Biological Sciences
Fort Hays State University
Hays, Kansas

[excerpted from letter by Marsha K. King]

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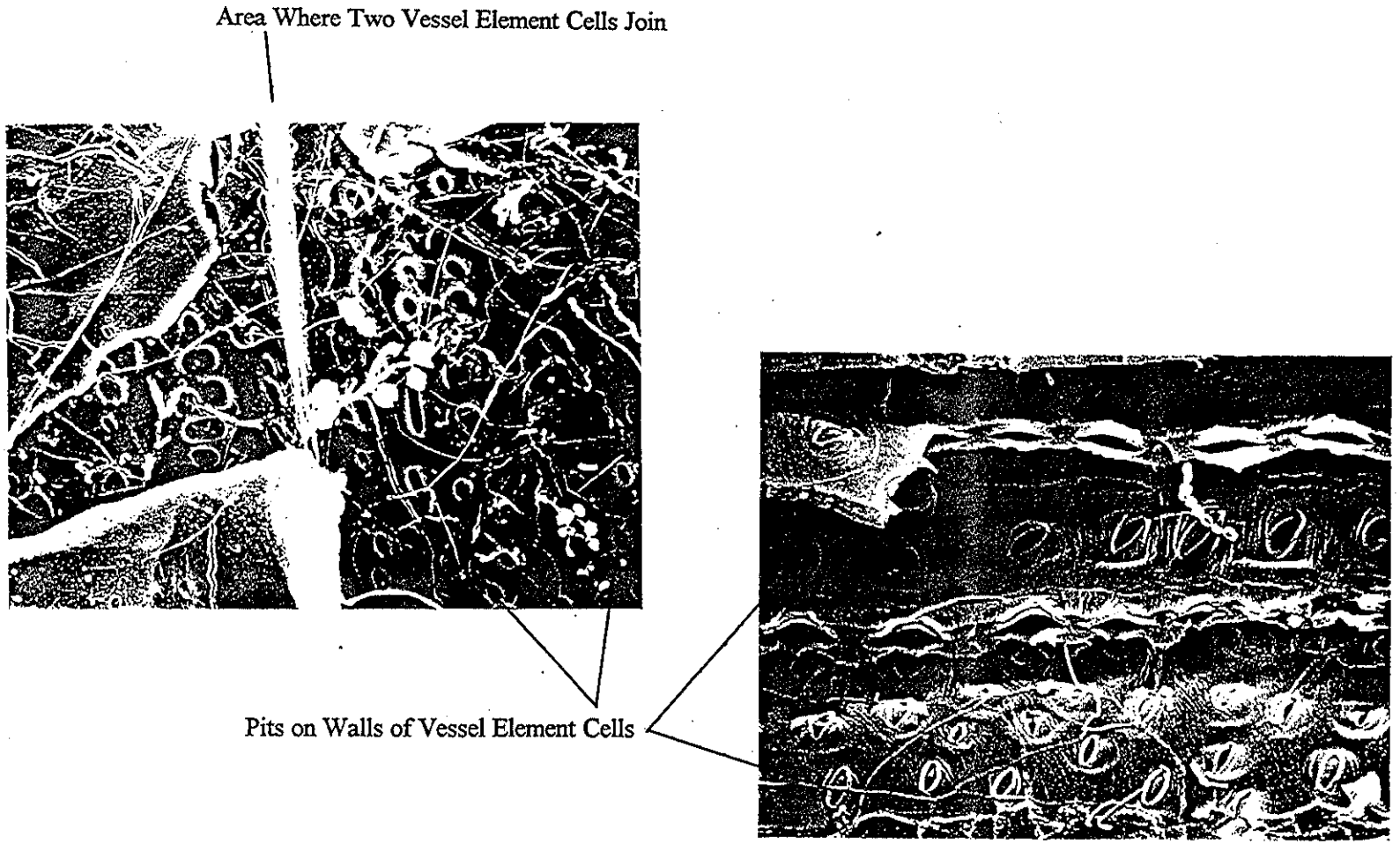

Figure 37. Scanning electron microscopy (SEM) micrographs of wood samples from F#981 at Fort Hays (14EL301) showing the internal structure of the wood as seen in cross-sections: A) magnification X1100, showing area where two vessel element cells join and pits on walls of vessel element cells; and B) magnification X2400, showing more detailed view of pits on walls of vessel element cells (SEM micrographs prepared by Dr. Joseph R. Thomasson, Scanning Electron Microscopy, Department of Biological Sciences, Fort Hays State University).

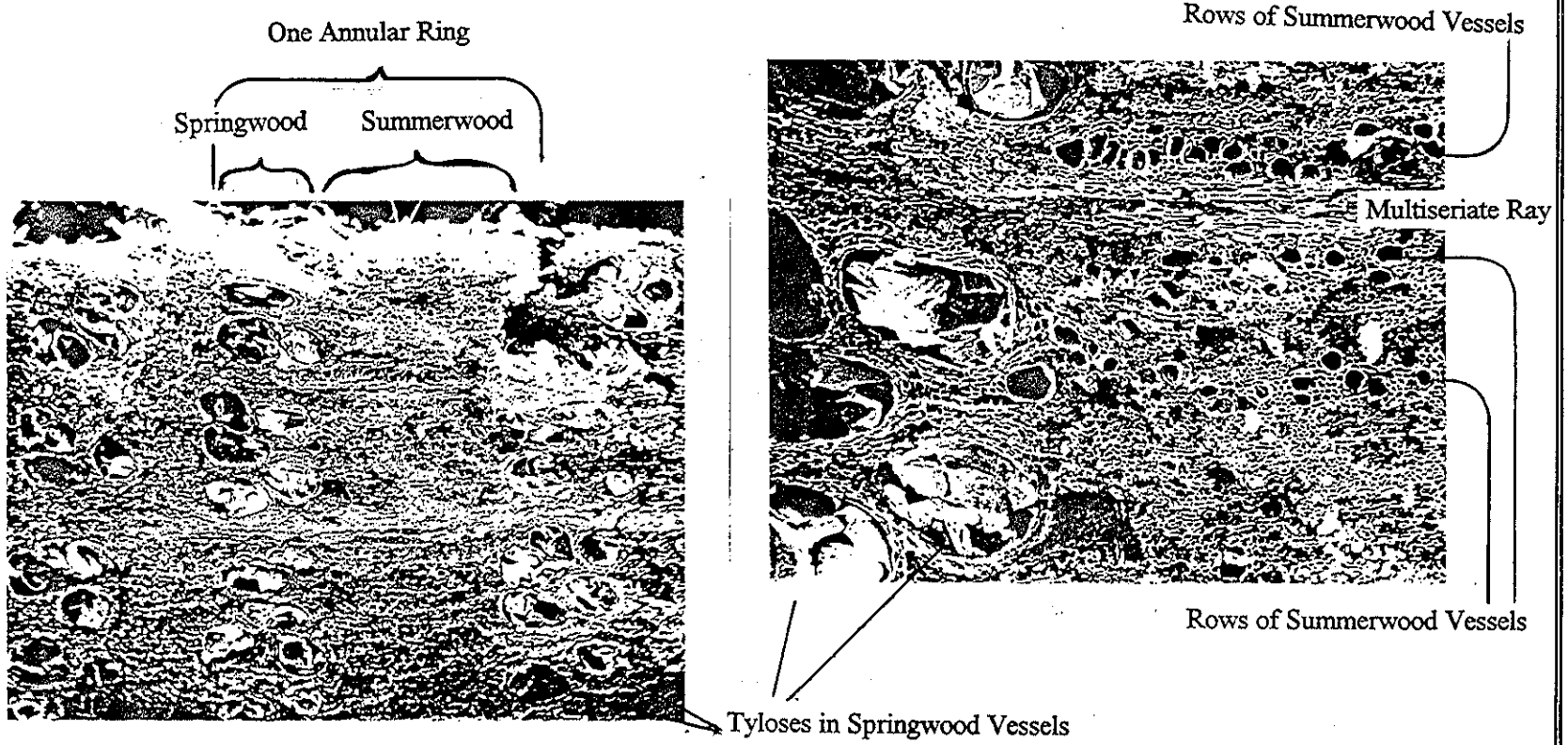

Figure 36. Scanning electron microscopy (SEM) micrographs of wood samples from F#981 at Fort Hays (14EL301) showing the internal structure of the wood as seen in cross-sections: A) magnification X37, showing springwood and summerwood vessels (pores) within one annular ring with abundant tyloses; and B) magnification X133, showing more detailed view of rows of summerwood vessels parallel to multiserate rays with tyloses in springwood vessels to left (SEM micrographs prepared by Dr. Joseph R. Thomasson, Scanning Electron Microscopy, Department of Biological Sciences, Fort Hays State University).